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MIDDLE AGE AND OLD AGE

LEONARD WILLIAMS

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MIDDLE AGE AND OLD AGE

BY

LEONARD WILLIAMS, M.D.

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PREFACE

When I set out to write this book, it was with the intention of limiting its scope to the circumstances surrounding complete Old Age. Apart, however, from the fact that this period had been ably and adequately dealt with by Sir Hermann Weber, Sir Humphry Rolleston, and others, it was soon borne in upon me that when a person has succeeded in arriving at the senile period, he has become to a large extent his own physician. He has learnt so to appreciate his capacities and to recognise his limitations, that any suggestions as to the most suitable mode of life based solely on general considerations are liable to be a work of rather impertinent supererogation. Without the application of common sense and intellectual honesty such a person had never attained to longevity, and when his methods have proved successful, it would, save in some minor details, be foolish—it would certainly be fruitless—to ask him to alter them.

To extend the period backwards into middle age and maturity would have meant a treatise on the whole practice of medicine, a task before which, in these days of super-specialism, the boldest heart might be excused an auricular flutter. I therefore decided upon a compromise. My book

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should be directed in the main to the consideration of the best means of arriving at Old Age, together with an inquiry into the present position of some of the maladies of middle age which militate against the attainment of a reasonable span of life. I am very conscious both of the omissions and the redundancies which the plan necessitated by such a compromise seems to have entailed, but I shall claim some measure of success if I succeed in awakening in the minds of my medical brethren a recognition of the urgent necessity for reforming the present habits, dietetic and otherwise, of the people.

Writing of the pathetic termination of his friend Randolph Churchill's meteoric career, Lord Rosebery says : " It is a black moment when the heralds proclaim the passing of the dead, and the great officers break their staves. But it is sadder still when it is the victim's own voice that announces his decadence, when it is the victim's own hand that breaks the staff in public. I wonder if generations to come will understand the pity of it ! " I think this moving passage might suitably be taken as a text on which to frame a homily of almost universal application. As things now are, it is generally, and not exceptionally, that it is the victim's own voice which announces his decadence, and the victim's own hand which deliberately, albeit ignorantly, breaks the staff in public. In this wider sense it is permissible to wonder whether the generations to come will see the pity of it all ; the pity of needless

disease, early senescence and premature death, preventible and yet not prevented, with all the human suffering and economic waste which these entail.

During the period of my professional life, the improvement of the public health has been steady and substantial. Successive ministries have vied with each other in the honourable task of educating local authorities and the public generally to their responsibilities in this matter, with results which are everywhere apparent, in the lessening of epidemics and the diminution of microbic disease. In the matter of personal hygiene it is unfortunately far otherwise. The principles on which the habits and customs of the individual are based have suffered no change, have certainly undergone no improvement in the last half-century. Save perhaps in the matter of excessive alcohol, the generation which is now in the vigour of life commits the same indiscretions and improprieties, and defends them with the same shibboleths, as their grandfathers did, with the result that metabolic disease shows no diminution either in frequency or deadliness. It is largely in the hope of awakening a sense of the pity of it all, and the folly, that I have written the following pages.

L. W.

January 1925

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MIDDLE AGE AND OLD AGE

CHAPTER I

PREAMBLE

It is said that as soon as a man is born, he begins to die. Regarded as an epigram, this may be accepted as to some extent true; but it is scientifically incorrect. Far more accurate is the saying of the melancholy Jaques:

> "And so from hour to hour we ripe and ripe,
> And then from hour to hour we rot and rot,
> And thereby hangs a tale."

There is, however, or ought to be, an interval of considerable duration between the hour at which we cease to ripe and the hour at which we begin to rot. A man's powers do not, of course, normally, begin to wane until he has ceased waxing, but even so there is a plateau on which he ought to remain in a state of efficient maturity for a long period before he shows signs of waning. It is the "ease on Lethe Wharf" which produces the fat weed condemned to premature decline. Man ought not therefore to begin to die until he has completed his full term of adult service to the community, which, as will appear later, may reasonably be estimated at 75 to 80 years of age.

The tendency in the past was to regard man as a special creation, a something transcendental,

to whom the ordinary laws of animal physiology were in no wise applicable. The teachings of Darwin, Huxley, and their successors, Keith, Shipley, Thomson, and others, have so far penetrated the mass of thinking people that the solidarity of the *genus homo* with the rest of the animal world is no longer in question. There is indeed some danger lest the insistence on the solidarity may obscure, for a time at any rate, some of the features which differentiate man from his nearest relatives in the evolutionary tree. To insist upon man's intimate somatic relationship with the Primates ought not to lead us to lose sight of the gulf which is fixed between his nervous system and theirs. The privileges of this supreme nervous possession on the part of man entail corresponding responsibilities. The former are always accepted; the latter, seldom. Among the responsibilities is the full utilisation of brain-power, for which purpose a span of life has been conferred upon the *genus homo* which, in comparison with that of his simian cousins, is enormous. Arguing on the analogy of the lower animals, in whose case there is a definite proportion between the time which it takes them to arrive at maturity, and the age at which they die, it is computed that man should live to about 120 years. Man is a long time in arriving at maturity, say 18 years, and that time is occupied mainly in the development of his central nervous system. If his nervous system were no more complicated than that of the anthropoid ape, he would come to maturity in his third or fourth year, and die about his twentieth. The purely somatic development is, in his case, a comparatively unimportant matter. The central nervous system is the pivot round which his whole

being is intended to revolve. This system goes on maturing long after his stature is complete, and should therefore continue its activities long after his purely somatic tissues are past their prime. Man is indeed an animal, but he is much more. Nevertheless, it is only by paying due attention to his purely animal necessities that he is enabled to fulfil his larger destiny. That larger destiny, the cultivation of science, art, the humanities, and the things of the spirit generally, is a function of the central nervous system. Work of the kind which the system furnishes can, and does, persist long after the muscles are no longer capable of feats of strength, and it is by no means infrequent to find that a man's best intellectual work has been accomplished when Time has emancipated him from the more turbulent claims of a vigorous manhood. It is obviously intended to be the rule of the dual control which governs man's earthy pilgrimage, that he should be born an animal body and gradually become a spiritual body. The transition begins about the age of 60, when, as Matthew Arnold put it,

> "Youth has done its tedious vain expense
> Of passions that for ever ebb and flow,"

and the mind, untrammelled by the excessive demands of the flesh, settles down to its own appointed task. As things are at present, the mind unfortunately is seldom given the opportunity. The outlook on life is for the most part purely, and therefore excessively, animal. Man recognises no necessity for so husbanding his animal resources as to prepare the way for his higher mental activities. The creature comforts and indulgences which sap his strength and shorten his span of life, he has come to

regard as his natural and legitimate heritage, and he declines to barter them against the problematical advantages of a green old age of fruitful mental activity. The proper attitude towards the animal period is to regard it as a period held in trust for the mental hereafter, a period during which the bodily resources should be managed with economy and frugality, in order that the mental period may be peaceful and fruitful. "The preservation of health," said Herbert Spencer, "is a duty. Few seem conscious that there is such a thing as physical morality."

That this view has not long ago been accepted and acted upon, means that the *Homo sapiens* has not yet learned to cultivate the habit of longevity. His outlook on life is still primitive, individualistic, and animal. He has been so much occupied with his combat against the ills of the flesh that he has come to regard this combat as the be-all and end-all of his existence. He is still to a large extent in the primal mood of marvels. When he has sown the seeds of disease in ignorance, and reaped his harvest in suffering, he calls upon a fetish to perform the miracle of deliverance. He has not yet learnt, he is only just beginning dimly to realise, that disease and premature death are the logical outcome of causes which he can himself control, and that no miracles can deliver him from the results, so long as he persists in cultivating the causes. He has learnt to babble that prevention is better than cure, but it has yet to be brought home to him that prevention is everything, and cure, nothing. His unfortunate faith in cures renders him impervious to any sane suggestions concerning prevention. He holds with a fervent faith the conviction that

the amenities of civilisation are his by right of inheritance, and is unable to recognise that these amenities are accompanied by countervailing dangers and disadvantages which he should seek to recognise and avoid. He holds fast to the amenities and demands a cure for their consequences.

An illustration of this state of mind is afforded by the attitude towards pulmonary tuberculosis which until quite recently reigned supreme in all classes of the community. So highly did man value the comfort of warmth and freedom from draughts, that he closed his doors, sealed his windows, and overclothed his person. When after many generations of this disastrous régime it was pointed out to him that, being an animal, fresh air was essential to his continued existence, he protested against the impious suggestion that there could be any solidarity between himself and the animal kingdom; that being created in the image of his Maker, he was superior to merely animal necessities. Although we can now afford to smile at this particular manifestation of arrogant stupidity, it is right that we should recognise that the same spirit continues unchecked in other and even more important departments of health. The battle of fresh air may be counted as won, but there remains a very formidable array of ignorance, prejudice, and vested interests, which combine to oppose all progress in other equally obvious directions.

The most important factor in a man's continued existence in a state of physical efficiency is the smooth working of his alimentary system. The material with which he seeks to repair his waste is obviously a subject which deserves his most

anxious and intimate consideration; and yet it is one which has been left largely to the haphazard behests of pleasure and the palate. As in the case of tuberculosis, lessons to be learned from the lower animals are scorned as of no application to so transcendent a creation as man. As used to be the case with fresh air, fresh foods are still rigidly banned, and the diet which Nature intended for man's consumption he refuses to eat until it has been subjected to some devitalising culinary conjuring. Cookery and concentration being among the amenities of civilisation, man accepts them as axiomatic, and declines to recognise therein anything which is even potentially deleterious. His inventions are esteemed as necessarily superior to Nature's crudities.

The discovery of the vitamins has done much to shake the erstwhile faith in the harmlessness of cookery, but there remain many other important questions on matters dietetic, the truth concerning which must be brought home both to the profession and the public, if any real step out of the present slough of damnatory despond is to be effected. The ignorance which prevails on the subject of dietetics is responsible for much preventible disease and for most premature deaths. And unfortunately this is a matter in which it is impossible to hold the medical profession blameless. The subject of diet, in so far as it concerns infants and young children, is sometimes taught in the schools, and vague empirical reference is occasionally tendered to students as to the dietaries of invalids, but no instruction is given about the diet most suitable to normal physiological man. The theory that the rôle of the physician is to enable society to sin without suffering

still seems to rule, even in the seats of scientific learning ; and students are taught, not how disease may be prevented and cured by rational dietetics, but how its symptoms may be relieved by synthetically prepared drugs. It was not an idle gibe, but a well-merited reproach, which declared that the science of medicine consisted in pouring drugs about which we know little, into stomachs about which we know less.

It is obvious that the material with which we repair our physiological waste is of the most serious import to the efficiency of the machine. To use the machine wrongly, by working it in a manner for which it was not originally designed, is the surest method of bringing about its early decline. That, in our ignorance of dietetics, is precisely what we are now busily engaged in doing, with the result that a machine intended to last for 120 years, shows serious signs of wear at 50 years of age, and may be confidently expected to peter out before 70. As matters stand at present, the ordinary man begins to " rot " at 30 years of age, and when he reaches 50 the sinister process is in full swing. The physical signs are not difficult of detection. They are writ large on the abdominal contour of the all-too-numerous victims. It is regarded as natural and physiological for a person to have achieved a considerable gain in weight by the time he reaches 40, and even insurance companies, which are necessarily merely materialistic, consider a gain of a stone between 25 and 50 to be perfectly normal. When we consider that this increment represents an excess of intake over output, and that the storage of the excess represents an enormous amount of unnecessary labour on the

part of the digestive and assimilating organs, it should scarcely surprise us that the said organs tend to wear out early. Moreover, though this superfluous material deposits itself mainly perhaps in the subcutaneous tissues, it also finds its way into the noble tissues of important organs and their immediate neighbourhood, producing an extra load which inevitably impedes their mechanical efficiency. If we remind ourselves what an extra pound or two on the back of a racehorse may mean to its winning capacity, we should not be making undue demands upon our imagination by estimating that an extra weight of 14 lb. in the human tissues at 50 years of age will go a very long way in reducing the individual's chances of reaching even threescore years and ten.

And these results are due mainly if not entirely to the faulty dietetic habits of the people ; ignorant habits which are by no means confined to one class in the community. It is indeed even more common to see overfed people in the middle and lower classes than in the upper. It is possibly an aftermath of the " hungry forties " that people with small means should spend such an enormous proportion of their earnings upon food which not only does them no good whatever, but seriously exhausts their energies and lessens their capacity for resisting disease. The theory that food " builds up " or " keeps up " the strength, which monopolises the field of the present, and leads to all manner of fantastic excess both in health and disease, leaves altogether out of the picture the exhausting labour to which the digestive and assimilating organs are condemned by the practice which the theory implies. In health it gives rise to sustained overwork, leading, grad-

ually enough but quite surely, to the disclosure of weak points in the effective mechanism, and sooner or later to definite crippling of the machine. In disease, the practice of overfeeding gives rise to most dramatic results, but unfortunately the results are seldom attributed to their real causes. There are more people floated into their coffins on a flood of beef-tea and milk than ever arrive there by the ravages of disease. In this matter we could learn much from the lower animals, if only we had the courage to do so. It is instinctive with all sick animals to refuse food. They recognise that their energies are required to combat the distemper which afflicts them, and they decline to divert those energies from the essential combat to the profitless procedure of storing useless material. They live on their reserves. Human beings in similar circumstances, especially children, are coaxed and cajoled, and even threatened, into contravening this obvious law of nature, with results which may be read in the death-rates, especially of acute diseases.

It is the ordinary practice of people in this country to eat four full meals a day, two of which are altogether unnecessary and therefore wholly deleterious. The bacon-and-egg breakfast, the pride of our race, is followed by the meat-and-pudding luncheon ; which is hotly pursued by a cake and bread-and-butter tea, to be succeeded by a three- or four-course dinner. In the case of weakly people who require "building up," a cup of beef-tea is insinuated at eleven, and a glass of milk at bedtime, "to promote sleep." Such an intake could scarcely be justified by an amount of vigorous physical exercise occupying at least eight hours, and when we consider that this daily

dietetic orgy is customary with people who at most walk the equivalent of three miles a day, it is not surprising that such a sustained and determined *batterie de cuisine* should give rise to very serious consequences. These consequences are not to be measured by mere adiposity. There are people who, though grossly overfed, yet never fatten. They are lucky, but not as lucky as they may seem to be; for though their hearts and other organs do not become overladen with fat, Nemesis lies in wait for them round other corners, to take the form of gout, hyperpiesis, diabetes, or, peradventure, angina pectoris. In the case of either of these types, or indeed of any other, an intake of the kind which is usual in this country, unless it be warranted by a very much larger muscular output than is customary, is wholly incompatible with continued physical efficiency. To drive the machine at that degree of high pressure is to court the disaster which comes.

Moderation in diet is the surest method of qualifying for longevity. What constitutes moderation is a matter upon which opinion is divided, for every one is to some extent a law unto himself. It must in the long run depend upon the balance between intake and output; so that, having regard to the very meagre muscular output which is possible to the ordinary sedentary liver, the present-day intake must be regarded as at once the most grotesque and serious of all drawbacks to the attainment of a high standard of health, efficiency, and longevity in the community.

The opinion that "we all eat too much" is one which is often smilingly emitted by people who never make any attempt to eat less. Surfeit

is a habit with some, a vice with others, but with the majority it is mere ignorance. People, otherwise sane and well-balanced, educated people, have often solemnly told me that they thought it was their duty to eat as much as possible in order to keep up their strength, and have expressed genuine surprise when the truths concerning intake and output were explained, and the fatiguing effects of an excessive intake demonstrated. For this ignorance the medical profession is largely responsible. It is not the practitioner's fault that, as a student, he was taught nothing about dietetics, nor can he be blamed if, later, he confines his interest in the subject to its bearing upon the treatment of gross disease, but a system which permits of such a state of matters is faulty in the extreme. If young medical men were turned forth from the schools thoroughly equipped in the principles of rational physiological feeding, their knowledge would quickly permeate all classes of society and do more to raise and sustain the standard of health in the community than all the drugs in the pharmacopœia.

Nor must it be supposed that the prevailing death-dealing ignorance is confined to the question of quantity; it is even more apparent when we come to consider quality. In answer to a question as to the most characteristic dishes of the ordinary Englishman, it would be correct to reply, roast beef and rice pudding; the former as representing butcher's meat in general, and the latter as typifying milk puddings as a class. Now, cooked butcher's meat contains practically no vitamins. All the vitamins come from the vegetable kingdom, and if there be any of them remaining in the carcass of a bullock, they are

merely those which have escaped utilisation by the living beast. Moreover, butcher's meat is material which, of malice aforethought, has sedulously been rendered toxic during the animal's lifetime. In the first place, his endocrine defences are interfered with by castration; he is then immobilised and overfed, with a view of causing him to develop fatty degeneration of all his organs, and it is when this ugly process is complete that he is regarded as fit for human consumption. It is this artificial pre-toxication of butcher's meat which justifies a distinction between proteins derived from such a source on the one hand, and on the other, proteins derived from fish, fowl, and game, all of which are in a healthy condition at the moment they are slaughtered. In admitting that there is some force in the arguments of those who hold that man is, partially at any rate, a carnivorous animal, it is necessary to remember that not only did primeval man hunt his game and thus justify its consumption, but that the flesh he ate was healthy flesh and raw, which having eaten he fasted from flesh foods until his next hunting expedition. No appeal to the dietetic customs of primeval man in support of flesh-eating can be considered valid which fails to take into account these very important considerations.

With a very large number of people, it is an article of simple faith that rice pudding is wholesome and nutritious. It is nothing of the sort. It consists of decorticated rice, boiled milk, and refined sugar, a combination cunningly devised to exclude every vestige of vitamin and every trace of salts, while retaining a crude concentrate of carbohydrates. In the matter of sugar alone, the

prevailing ignorance is as disastrous as it is surprising. Save in the text-books specially devoted to Dietetics, such as Dr. Robert Hutchison's classic,(1) sugar is referred to as "sugar," no difference between the various kinds being even suggested. It would be just as reasonable to speak of "chloride of mercury" without differentiating between calomel and corrosive sublimate. For the difference between the monosaccharides on the one hand, and the disaccharides on the other, is no less important in its way than the difference between mercurous chloride and mercuric.

The disaccharides, otherwise known as the sucroses, are represented in common use by cane sugar and beet sugar, which means that they form a very large proportion of ordinary household sugar.

The monosaccharides, otherwise known as the glucoses, include grape sugar (dextrose), fruit sugar (fructose or lævulose), and invert sugar, which is a combination of the two foregoing. The best example of invert sugar is presented by honey.

It is unnecessary to draw any distinction between the two disaccharides, cane sugar and beet sugar, for although in the two cases the source is different, the product is chemically identical. We may, therefore, consider them together under one heading. Cane sugar is a highly refined and concentrated product obtained from the sugar-cane. In the natural cane it is associated with a great many other substances, including glucose. The degree of concentration may be gauged from the surprising fact that it requires about fifty sticks of ordinary sugar-cane to make one pound of loaf sugar.(2) This means

that every large lump of sugar is equal to about 2 feet of cane. In this country, therefore, children frequently eat the equivalent of 12 feet of sugar-cane in a few minutes, while many adults consume the equivalent of 2 to 6 feet of sugar-cane in a cup of tea. It is a well-known fact that ordinary cane sugar, or sucrose, has to be converted into a monosaccharide before it can be assimilated. It is true that provision is made in the alimentary tract for this necessary conversion, but not only is the amount of that provision obviously limited, but the energy expended in the operation must not be forgotten. The provision takes the form of ferments which are secreted into the intestinal canal in relatively small quantities. Cane sugar is therefore *per se* indigestible, and the more concentrated it is, the more indigestible does it become. In strong solutions sugar is well known to be an irritant of the tissues. This is commonly observed in the eczema which is seen on the arms of grocers and other people who constantly handle sugar. On the stomach, in strong solution, it acts as a violent irritant. It produces a considerable outflow of mucus, together with the secretion of a highly acid gastric juice. A large quantity of cane sugar, therefore, even when taken with the meal, acts both as an irritant to the stomach itself and as a serious retarder of the digestive process. It is thus obvious that sugar, which is, of course, an essential element in our food-stuffs, should not be taken in a concentrated form, and that cane sugar, though convenient, has very serious countervailing disadvantages.

The foregoing is in no sense true of the monosaccharides. All three of these—dextrose, fructose,

and invert sugar—are immediately assimilated; no energy is wasted in converting them from one form to another, and they exercise no irritating effect upon the gastric mucous membrane. This is more especially true of fructose and honey, neither of which is in any degree crystallisable. It is probably less true of artificially prepared dextrose, on account of the impurities which are apt to creep in during the process of its commercial manufacture; but of natural dextrose or true grape sugar, it is.

When sugar enters into the blood, its ultimate fate is to be converted into glycogen by the liver. Now, it has been found that only those sugars which are directly fermentable by yeast are capable of suffering this conversion into glycogen. The disaccharides are not directly fermentable by yeast, which means that before they can be stored up as glycogen they must, as we have seen, become changed into monosaccharides. It not infrequently happens, however, that the capacity of the ferments to bring about the all-essential inversion may, from exhaustion and other causes, be but feeble; and if, at the same time, the absorptive power in the intestine is considerable, some of the alien cane sugar must be passed into the blood unchanged. Being incapable of conversion into glycogen, it straightway appears in the urine. This is what is known as alimentary glycosuria, an easily overlooked abnormal condition, which is a frequent forerunner of true diabetes.

From the above, it is quite obvious that it is not correct, as is so often done, to speak of sugar as a readily assimilable food. It is certainly true of the monosaccharides, but conspicuously untrue of the disaccharides, and yet nine-tenths of the

sugar consumed by the people in this country is presented to them in the form of the indigestible and irritant disaccharide.

Every one now agrees that the attempt to concentrate proteins, in beef tea and in other ways, has resulted in disastrous failure. It is high time that the profession awakened to the fact that the habit of concentrating sugar is fraught with consequences, different perhaps, but equally disastrous. The *genus homo* was not intended to tamper with his food-stuffs. His attempts in this direction, provoked by greed and supported by arrogance, have all, sooner or later, brought trouble in their train. In order to arrive at true principles in this matter we must return to natural food-stuffs, uncooked and unconcentrated, and seek, on that secure foundation, to erect a superstructure free from scientific and practical reproach. We do not know what the elements in our food-stuffs are which render them suitable to our digestive organs. The discovery of the vitamins has not only thrown a flood of light upon many dark places, but it has emphasised the fact that it is impossible to regard our food-stuffs merely from the point of view of their proximate principles: still less is it possible to speak of them in terms of calories. It is now probable, indeed it is almost certain, that these proximate principles are only tolerable to the human economy when presented in the combinations in which they are found in nature. For there is a certain balance not only between the proximate principles themselves, but between certain factors less well recognised, but no less important, concerning which we at present know far less than we ought to know.

Perhaps the most outstanding of these neglected factors are the mineral salts. Having regard to the fact that through our amphibious ancestors we are derivatives of the ocean, it need not surprise us to know that mineral salts are of the very essence of our being. Our very blood is but sea water with certain corpuscles and other organic principles superadded, and we are quite unable to renew or replenish the mineral salts contained therein, and in the tissues which are bathed thereby, unless we appeal for aid to the foods with which Nature supplies us. Salts of calcium, iodine, magnesium, sodium, potassium, and iron are all in various degrees essential not only to our well-being, but to our continued existence, and these are no more to be found adequately represented in our present cooked foods than they can be expected in a beef lozenge.

The importance of the mineral salts, especially those which reach us from the ocean, has recently been rather dramatically emphasised in the case of iodine. Iodine reaches us from the sea itself, carried by the spray; from salt-water fish, notably the herring and the cod, and mixed with chloride of sodium, as common salt. Goitrous districts, as in Switzerland, are far removed from the seaboard, so that spray and fish furnish them with no iodine, the only available source of which is therefore common salt. Here again the arrogantly stupid hand of pseudo-scientific man has intervened to nullify Nature's well-laid plans. By refining the NaCl, intended for table salt, the iodine content of the natural product has been abolished, and inland dwellers have been deprived, some relatively, others absolutely, of an essential constituent of food. Since the children in certain goitrous Swiss

districts have been served with a ration of iodine, the goitres have disappeared, and no more cretins are born.(3) And not only is the presence of these mineral constituents in our foods important, but the element of their quantitative relationship to one another, their balance, has recently been shown to be a question of the deepest moment. Dr. John Boyd Orr directs attention to this side of the question in a most valuable paper recently published.(4) He says:

"The amount of any mineral which must be present in the diet depends upon a number of factors which influence either its absorption or its excretion. In estimating the mineral requirements these factors must be taken into account. Some which are of practical importance are considered here.

"The mineral may be present in a combination from which it cannot be easily dissociated in the alimentary canal. The diet, therefore, might contain a sufficient amount, as determined by chemical analysis, but, owing to the difficulty of assimilation, only a very small proportion might pass through the wall of the intestine into the metabolic field where it could be utilized. In the case of most minerals both absorption from the intestine and excretion by the kidney are influenced by the amounts of other minerals present. Bunge [1] showed that the addition of potassium salts to the diet caused an increased excretion of sodium salts in the urine. The results of some recent work by Dr. Richards, which will be published shortly, indicate that the potassium-sodium ratio in the diet is a factor in determining the percentage of ingested calcium and phosphorus which can be assimilated and retained by the growing animal. These results confirm the con-

[1] Bunge (1873), *Ztschr. f. Biol.*, Bd. ix. S. 104.

clusion reached by Zander [1] and others over forty years ago.

"Hart and Steenbock [2] have shown that excess of magnesium interfered with the utilization of calcium. Phosphorus and calcium are mutually dependent upon each other for utilization. So also, to some extent, are calcium and iron. The balance of the base and the acid radicles affects both absorption and excretion. These examples of the interdependence of the different mineral constituents of the diet to each other are of as much importance as the absolute amounts."

The author then proceeds as follows:

"Fortunately mineral deficiencies can be easily corrected by including in the diet food-stuffs the virtues of which are universally recognized. Milk, green vegetables, and certain fruits are rich in calcium: milk, egg yolk, and cereals containing sufficient of the embryo and outer part of the grain are rich in phosphorus. Green vegetables and egg yolk are rich in iron. The only certain sources of iodine are green vegetables and cod-liver oil. Fruits and vegetables have an excess of alkali, and thus can correct a diet which is too acid. On account of its great wealth of calcium and iron, spinach should be of special value for infants. These food-stuffs, which are rich in inorganic constituents liable to be deficient in the modern diet, are also rich in vitamins."

Following McCarrison, it is then suggested that a proper balance of food-stuffs, proximate principles, and minerals is in reality more important

[1] Zander (1881), *Virchow's Archiv f. pathol. Anat.*, Bd. lxxxiii. S. 377.

[2] Hart and Steenbock (1913), *Journ. Biol. Chem.*, vol. xiv. p. 75.

than vitamins. From the point of view which I am venturing to emphasise here, this is a matter of no importance; for if the food-stuffs consist of unmitigated natural food, both the salts and the vitamins will be abundantly present in their right proportion, whereas a dietary erected on the arguments of test-tubes, retorts, and casseroles can never be more than a dangerous experiment.

Baron Berzelius (1779–1848), the Swedish chemist, recognised the phenomenon called "catalysis," in which certain substances, by their presence alone, set into activity chemical processes otherwise dormant, without themselves undergoing any chemical change. For instance, peroxide of hydrogen is decomposed by many insoluble substances, such as metallic silver, the substance itself undergoing no chemical change whatever. Having regard to the fact that our gastro-intestinal activities are due in a very large measure to the action of ferments, it seems obvious that this phenomenon of catalysis plays a very prominent and important part in determining and stimulating these activities. When we realise that the mere presence of a substance which, while suffering no apparent change in itself, is nevertheless able profoundly to modify other substances, even *in vitro*, we ought to be alive to the probability of such a phenomenon occurring as a part, and indeed an essential part, of the normal physiology of digestion and assimilation. Though catalysts are at present very difficult of detection, we can safely affirm that, like vitamins, they are present in natural foods and absent from artificially prepared foods. Sir William Bayliss,[5] although treating of catalysts and ferments in a most interesting and instructive manner, does not deal

with them from the point of view of dietetics. It would be very helpful if some diligent physiologist would apply himself to the elucidation of the very important problems presented by this side of the question. In the meantime, we are entitled to assume that catalysts in our food-stuffs are as important as vitamins, and that, like vitamins, they are to be found in their fullest activity only in such foods as have escaped the tampering attentions of man.

It seems strange that the lord of creation should be the only animal who does not know how to select his food. In this matter, as in some others, he has lost the instinct of self-preservation. Even active poisons he will take without any foreknowledge of their lethal effects, and in the matter of chronic poisons he is not only ignorant but is seemingly quite content to remain so. As long as man continues to offer up his physical and mental efficiency as a sacrifice on the altar of greed and ignorance, he cannot expect to attain to the length of days which is his original birthright. He must abjure the cooked and concentrated foods which have led to his undoing, and return to the cultivation of those kindly fruits of the earth for which he thanks the Lord on Sunday and relegates to a back seat in the dietary of his daily life.

Another lesson which we may profitably learn from the lower animals is the value of fasting, not only as a curative, but as a prophylactic measure. This is an important matter to be considered later, in some detail.

Closely associated with the question of intake of suitable food is the question of the discharge of waste material. Arbuthnot Lane has shown

us the dangers which lurk in chronic intestinal stasis. There can be no manner of doubt as to the correctness of the views which he has advanced, but in order to understand the situation as it now presents itself, it is necessary to find a reason for the fact that the vast majority of present-day sedentary livers suffer in some degree from the condition to which Arbuthnot Lane has so properly and courageously directed attention.

In the matter of arterial disease it is recognised that the quality of the blood which passes along the arteries is often responsible for disease in the arteries themselves ; that, in fact, arterial sclerosis is due to a chronic irritation primarily of the intima and eventually of the middle coat, brought about by the impure state of the traversing blood. Now, if it is possible for the material passing along a conduit to influence the integrity of the walls of that conduit, as admittedly it is, then the principle is surely applicable to the intestinal tract, and it is safe to affirm that the stasis which so often takes place in that tract is due to the toxic nature of the material which passes along it. We know that certain substances are irritants of the tract, and that certain other substances are sedatives of the tract. In the same way we may suppose that, just as some types of food, or their wastes, produce a stimulating effect upon peristaltic action, so other types of food, or their wastes, produce a retarding effect upon the peristaltic action. If the food which we eat is unsuitable and devitalised, it is reasonable to argue that it will fail to give the necessary stimulus to the musculature of the intestinal wall ; nor is it pushing imagination too far to concede that not only may such food be lacking in the necessary stimulus,

but that it may provide material which is definitely retarding or paralysing in its effects. The devitalised and concentrated foods which people are now in the habit of eating certainly contribute in many ways to the production of intestinal stasis. It is, for example, a commonplace with all who have studied the subject, that foods which do not provide a sufficiency of "ballast" are apt to produce constipation; and it is obvious that the cooked and concentrated foods now in common use do not contain this all-essential element. There are indeed not a few laxatives on the market which depend for their efficacy upon the provision of this ballast, which is so conspicuously lacking in the ordinary intake of civilised man. To live on foods which have been deprived of ballast, bereft of vitamins, and despoiled of catalysts and salts is to invite intestinal stasis with all its sinister attendants.

It is, moreover, certain that the normal changes which food undergoes in the gastro-intestinal tract are due in a large measure to the action of ferments. I have already pointed out that catalytic action may be considered to be responsible for certain of our digestive and assimilative processes, and I can have little doubt that catalysis is a factor, if indeed it be not the principal factor, in bringing about, or activating, the complicated processes by which food is disintegrated, and the waste matters fully and promptly discharged. The catalysts in this matter certainly come from the food, and in order to be certain that those catalysts are present in sufficient quantity, it is necessary that the food should be taken as Nature intended it to be taken—that is, as free as possible from the attentions of the cook or the wholesale

chemist. To leave out of account the action of catalysis in the workshop of the gastro-intestinal tract, which is admitted to be teeming with all kinds of ferments, is to turn a blind eye to one of the principal factors in the processes of digestion and assimilation.

The importance of natural food—food, that is, which has escaped the meddlesome hand of man—is nowhere better exemplified than in the behaviour of the *Bacillus coli communis*. The character of this bacillus depends entirely upon the nature of the soil on which it feeds. When it is cultivated upon a bed of animal protein, as in the case of the ordinary mixed feeder of to-day, it is a highly putrefactive organism and may be considered one of man's worst enemies. It does not confine its attentions to the large intestine, but it organises successful raids into neighbouring organs, there to set up various maleficent processes. If, however, this same microbe is grown on a pabulum which consists chiefly of carbohydrates, it ceases to be putrefactive, our worst enemy, and becomes fermentative, our best friend. The problem which has so far presented itself has been that of so arranging matters as to ensure that the carbohydrates win through to the lower reaches of the intestinal tract, the normal habitat of the bacillus. The carbohydrates have to pass unscathed through the mouth; to slip past the duodenum; and in the small intestine to avoid the various activities of the succus entericus. If, however, the carbohydrate is presented to the mouth in an insoluble covering of cellulose, it has no difficulty in passing unaltered through the various gastro-intestinal agencies which would otherwise overwhelm it. In this way it reaches the colonic habitat of the

Bacillus coli communis, and transforms that bacterium from an enemy into a friend.

The meaning of this is that those who live on natural foods never suffer from intestinal stasis, and even if, by having previously acquired it, they should unfortunately do so, the retention of the effete material is a matter of comparatively small importance, for the reason that it contains none of the paralysing putrefactive toxins which the ordinary dietary produces in such large measure. It is within my own experience that many people who, for a period of thirty years and more, had not dared to go to bed without taking 2 grains of cascara, or its equivalent, so soon as they had brought their dietetic habits into consonance with science and common sense, were able to dispense completely and permanently with every form of laxative. Some, at any rate, of these have been people in whom there was every reason to believe there existed mechanical causes of chronic intestinal stasis, the kinks and bands which have so often been described by Arbuthnot Lane. The truth is, the ordinary standard which prevails in the matter of alvine evacuation is ridiculously low. Many people who go regularly to stool, live in a fool's paradise. They imagine that in voiding a small quantity of fæces they are really debarrassing themselves of their waste matters. When such people learn what the real standard of complete evacuation is, which as the result of practising a rational and natural dietary they soon do, they are astonished that they should have kept as healthy as they did on their former meagre discharges.

I have already mentioned fasting as an instance of how we may learn wisdom from the lower

animals. As a therapeutic measure, fasting has been restored to us by Allen, who introduced the starvation treatment of diabetes. The system is now fairly well known; it consists of a three or more days' fast until all sugar has disappeared from the urine. It was a successful form of treatment which held the field before the introduction of insulin, and its success has led to its employment in the treatment of other chronic diseases. It would be a good thing if it came into more general favour as a means of redressing the balance between intake and output which now weighs so heavily in favour of the former. For those who try it, fasting is by no means the terrible exercise which it seems in anticipation to be. The first essential is to be sure that the lower reaches of the intestine are completely empty, otherwise there is serious danger of reabsorption of undesirable matters from the colon. A fast, then, should always be preceded by a purge. The second essential is that the fast must be absolute; that is, nothing but water must pass the lips during the prescribed period. If food of any kind is taken, a desire for more food is immediately engendered; whereas if nothing at all is ingested save water, though the desire for food may present itself at the times of ordinary meals, the desire very soon passes off, especially if the faster is mentally and bodily occupied. On the second day the desire for food is sensibly diminished, even at the ordinary meal-times, and on the third day the desire tends almost completely to disappear. It is sometimes held that it is a good thing to keep warm in bed during the fast, but if the person be in moderately good health, then it is much better that he should attend to his ordinary occupations. To lie in bed

is to encourage an attitude of self-pity, which is as easy as it is undesirable. The ordinary occupations assist one to forget the severities of the discipline. Of course the trial is more of a trial to some people than to others, but it should hold no terrors for those who complain of a want of appetite, and possess considerable attractions to those who seek either to reduce their bulk, or to get the better of invading toxins.

The third essential in a fast is that when it is broken it should be broken with a very small meal. Even the other two meals on the fourth day should be definitely less than the amount usually taken. There have been people who prolonged their fast over the third day, even for considerable periods, and they have protested that they have felt no worse at the end of a fortnight than they did at the end of the third day. However that may be, three days would seem to be sufficient for ordinary purposes. At the end of that time a person is already drawing largely upon his reserves, and is therefore oxidising deleterious matters which were clogging and slowing the wheels of being. When we consider that fasting is a measure automatically resorted to by all the lower animals when they are ill, we can realise its importance in the scheme of things therapeutic. An instinct of this kind must have been evolved on a very sound physiological basis, and our reason should guide us to imitate it as closely as possible. I speak from repeated personal experience when I say that fasting will not only cut short many threatening infections, but will induce a sense of renewed energy and well-being in people who are substantially healthy. Inasmuch as fasting is liable to induce a state of acidosis (see Chapter V.), it

is well to advise people to drink plenty of alkaline fluid, say, Vichy water during the whole period of the fast. This should not be forgotten, because even a slight degree of acidosis renders the discipline more difficult to bear.

Another means of redressing the balance between intake and output is by baths of high temperature with or without massage and electricity. Such baths, whether of hot water, hot air, hot vapour, or of radiant heat, raise the temperature of the blood by 2 or more degrees Fahrenheit, thus producing a degree of oxidation which is not attained by any other means save muscular exercise and fever. It used commonly and quite truthfully to be said that people who suffered from chronic indefinable malaise became very much improved in health as the result of a " good illness." The " good illness " took the form of an acute fever, and it was doubtless the rise of temperature over a more or less prolonged period and the consequent oxidation of suboxidised matters which produced the beneficial effect. The present-day movement in favour of sun baths and their artificial equivalents is very much to be commended. It is as yet too early to speak of the full therapeutic value of the ultra-violet rays, but I think it is fair to assert that some of the advantages to be obtained from such exposure are due to the increased oxidation and heightened metabolism thus brought about.

Better, however, than all these more or less artificial aids, is Nature's method of promoting metabolism, if only such can be obtained in sufficient quantity. I refer to muscular exercise, with which nothing can compare. The influence of muscular exercise upon the digestive and

nervous systems is the most important of all elements in maintaining health. It is the combination of excessive and unsuitable food, with the lack of sufficient exercise necessarily imposed upon sedentary workers, that sows the seed of most of the chronic diseases which vex and threaten life. There are many expedients open to city dwellers for obtaining muscular exercise in their own homes, all of which are on many grounds to be commended. The best with which I am acquainted is the sculling-machine. This ingenious device exercises all the muscles of the body; it should be used in a room with the window open, either in the early morning or late at night. The degree of vigour with which it is used can be regulated by the individual.

Exercise in the open air, however, is superior to anything which can be undertaken indoors, and the best form of exercise for the open air is undoubtedly walking. A walk of three miles a day is possible to everybody, and should on no account be neglected by those who are unable to take more active exercise. The only objection to walking as a form of exercise is that so few people know how to walk properly. If a person slouches and ambles, instead of walking with the chest out and abdominal muscles contracted, in the military fashion, then a large amount of the benefit which ought to accrue therefrom is lost. It is, therefore, well to advise people to cultivate exercises which have a special reference to the muscles in the abdominal wall. If these muscles are allowed to become lax, there results a condition of visceroptosis which is a most potent cause of chronic intestinal stasis and other troubles. If people are urged to go through certain of these exercises

every morning as regularly as they have a bath or brush their teeth, the habit very soon becomes ingrained, and they miss the exercises if they neglect them. In the case of people who are already abdominally opulent, it is well to be cautious at first. I have known the intempestive use of these exercises to produce hernia, with the consequent loss of some considerable credit to the practitioner who advised them. When in such cases exercises are undertaken, it is well that they should be supervised either by a competent instructor or by the medical man himself.

In discussing the question of food, I purposely omitted a reference to alcoholic drinks, partly because I think it unlikely that anything that I might have to say would succeed in persuading a Pussyfoot to reason, or deter a moderate drinker from his little indulgence. The proper attitude for the medical profession to adopt in this matter would seem to be, first of all, the frank recognition that alcoholic drinks are not necessary to healthy people, but that taken occasionally and in strict moderation they do no harm. It may, further, with safety be asserted that under certain conditions they do a great deal of good. It should, however, be freely admitted that alcoholic drinks should be reserved for the period of the day when work is over. The old rule of "no drinks before dinner" is essentially a sound one, and people should be advised against taking alcohol until the time when the relaxation which it promotes can properly be enjoyed. "Drinks" are better avoided at the midday meal, and there is no excuse whatever for taking them between meals. The habit of cocktail-drinking which prevails in a certain section of society is altogether without excuse.

Cocktails irritate the stomach and promote a fictitious appetite which eventually leads to dyspepsia and other more serious troubles. They have the further objection of impairing the appreciation of really good wines.

Blood-letting, or venesection, is a therapeutic measure which has quite undeservedly fallen into disrepute. Lord Beaconsfield said of Protection that it was "not only dead, but damned." Thirty years ago it would have seemed perfectly safe to apply the same phrase to venesection; and yet, in both cases, the expectation has been falsified by the event. By those best qualified to speak of it from experience, namely, the general practitioner, blood-letting has been advocated during the last fifteen years, not in Gath truly, but furtively, shamefacedly, and in the fear of the pseudo-scientific superman. But these gentle counsellors have been assailed with such vociferous energy by the pseudo-scientist, that their timid voices have scarcely been heard. Of late, however, one or two more adventurous spirits have actually dared to suggest that in the broken compensation of mitral disease, especially in stenosis, phlebotomy should be a regular rule of practice. In deference to the unyielding prejudice of the public, some will use leeches, but not the lancet. But, to afford any real relief to the labouring right heart when the hepatic relief-tank is full to pulsation, venesection should withdraw at least 20 ounces of blood; so that, although they are undoubtedly valuable in local congestions, in their relation to general blood-letting, leeches are neither fish, flesh, fowl, nor good red herring.

In my student days, I would occasionally accompany on his rounds a very shrewd and

observant old general practitioner in a country district in Wales. I wish now that I had gone with him more frequently, for I never returned without having learnt something of value. It was then that I saw my first venesection. The patient was a young woman in the throes of what I now know to have been a typical attack of spasmodic asthma. My old friend improvised a ligature with a wet and dirty duster, which he tied tightly above the bend of the left elbow. With his unwashen hands, from the depths of his breeches pocket he pulled a grimy vaccination lancet, the point of which he plunged without further ado into the already-bulging median basilic. There was a terrible mess, but the relief to the patient's condition was speedy and complete. When about 30 ounces had been abstracted (circumfused over the floor and the furniture it seemed like a gallon) the same duster which had served as a ligature was applied to the bleeding point, and we left, to continue our round. As soon as the pony had settled into his leisurely amble, the old doctor turned to me and said, not without acerbity, "Nothing else would have relieved that woman. Don't you ever believe the damned nonsense which is talked against bleeding." And I never have. I now know that a small dose, a very small dose of adrenalin, had such a thing been then in existence, would have relieved that patient; but that is by the way.

From the empirical country practitioner of the early eighties to the courtly Professor who learnedly discourses of Physic in the University of Cambridge to-day, it is a far cry; and the interval has been fraught with many vicissitudes to the practice of phlebotomy. I first heard Sir Clifford Allbutt

speak in praise of blood-letting in 1907, and I find this view confirmed in his classical work on *Diseases of the Arteries*.([6]) The passage is quoted in its entirety. To epitomise it would be irreverence; to paraphrase it, desecration.

"Of the vast abuses of bleeding I will say nothing; I remember the last of them too well in Bouillaud's wards. As in Sangrado's day in Western Europe, so of this fashion in ancient Rome Celsus sagely writes: 'Venesection is no new thing; what is new is that there is scarcely any malady in which it is not practised.' But amid the crowd of Sangrados there were, as amid all controversies, wise and thoughtful men who used their remedies with sagacity and economy; such men, for example, as Wepfer, of whose sensible practice we may read in his book on Apoplexy. They bled 'not pale and delicate persons, but those who loved meat, generous wines, and choice dishes . . . such have much blood, their urine is thick, and some ebullition of humours is to be feared in them.' Now such urine indicates not chronic renal disease, but hyperpiesia. Lancisi, after pointing out the benefit of blood-letting in plethora, proceeds to warn the reader against bleeding too heavily, 'which may lead to cachexia and dropsy.' He reflects, '*adeo verum est prudentiam in medico potiorem esse virtutum partem.*'"

Others writers of credit and prestige are now extolling blood-letting in conditions other than the hyperpiesis to which Sir Clifford Allbutt confines his attention. Rose Bradford lends the weight of his authority to its use in acute nephritis: "In acute renal disease of a severe type, where the urinary functions are not only seriously hampered, but may be suppressed, great benefit may be obtained from venesection." Samuel West advo-

cated it in acute uræmia. Oliphant Nicholson speaks of it as a " valuable therapeutic measure " in eclampsia. Cecil Wall gives it his blessing in pneumothorax ; and Leonard Guthrie, his benediction in apoplexy.

Hale-White ([7]) is also among the prophets. His blood-letting activities are, however, confined almost entirely to conditions in which " the right side of the heart is overgorged with blood." He quotes Wilks' classical picture : " You see your patient sitting up in bed, the face, tongue, and lips blue or purple, and the jugular veins starting out of the neck, and often visibly pulsating ; the heart beating quickly, with, perhaps, a tricuspid bruit, indicating the gorged right heart and obstructed lungs " ; and says that such is the most satisfactory case to bleed. " It has been said," continues Hale-White, " that bleeding would not do any good for such a case, owing to the valves in the veins. All I know is that it does do good, and the distressing condition immediately passes off." There speaks the true clinician, independent in thought and resourceful in action.

In acute pulmonary œdema, I have myself ([8]) quoted authorities in favour of the practice of venesection, of which the following from Huchard and Fiessinger is, perhaps the most arresting : " *L'asphyxie est rapide. Pas une minute n'est à perdre. Il faut pratiquer la saignée . . . La saignée doit être large : 300 à 400 grammes. Le médecin n'hésitera pas. Sans crainte de la syncope, et malgré l'aspect blafard du malade, il tirera la quantité de sang nécessaire.*" For blood-letting, then, we may claim that it has established for itself a scientific position from which it can scarcely now be displaced, even by the theorists who babble

meaningless platitudes about bleeding a man into his own blood vessels. It is certain that strange toxins are introduced directly into the blood by the thoracic duct, and it may be that some of these, while finding a ready escape through an aperture in a vein, knock vainly at the portals of the orthodox emunctories. It is probable that blood-letting produces in a minor degree the same purifying effect as a seton or a fixation abscess.

The success of venesection in hyperpiesis suggests that a part at any rate of its beneficial effects in morbid states due to retardation of tissue change, of which hyperpiesis is essentially one, may be brought about by the stimulation of the blood-forming glands. The withdrawal of the blood rouses the organism to make good the loss. Metabolism is increased by the introduction of young and fresh elements into the blood which may be assumed to be more active than those which have been abstracted. In addition, it may be supposed that certain effete matters escape rapidly through the incised vein, which find a difficulty in doing so by the ordinary routes.

To obviate the rather messy results of any ordinary venesection, Herbert French ([9]) suggests that the vein should be punctured rather than incised. This method has considerable advantages over that which was practised by our forefathers, and presents no difficulty to those who are accustomed to handle a hypodermic needle.

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CHAPTER II

THE SUMMIT PLATEAU

When a man reaches the crest of the hill of his earthly pilgrimage he finds himself on a plateau. He may be said to reach the crest of the hill at the age of 30. As things now are he has attained to the far end of the plateau by the time he is 45, and when he has reached 50 he is usually well on his way down a rapidly falling slope. I plead for a longer plateau and a more gradual slope. In the nature of man or his natural environment, there is no reason why the level plateau should not extend beyond 70 years, and this it assuredly would do if, on reaching the crest of the hill, the pilgrim will take a serious view of the prospect, and adapt his habits to the stage at which he has arrived. "Strength of nature in youth," says Bacon, "passeth over many excesses which are owing a man till his age." That is doubtless to a large extent true, but as there is no present means of preventing the excesses of youth, and probably never will be, the best one can do is to be sure that they are not prolonged into the period of maturity. St. Paul urges us to "forget those things which are behind, and reach forth unto those things which are before." On attaining the plateau, we must forget the joys and pleasures of youth and settle down to cultivate those which are the privilege of maturity. Henry James says that "Life is a predicament which precedes

death." But if life is lived in true consonance with advancing years it should never be a predicament at all. The fact that it is a predicament (and it too often is) arises from the attempt to do that which Bacon solemnly warns us against doing when he says: "Discern of the coming on of years, and think not to do the same things still, for age will not be defied."

It frequently happens that when a man ought to be in the prime of his maturity, say, 50 to 60, he shows unmistakable signs of the ruthless ravages of time. It is not really time that does the damage, but the bad use to which time has been put. He has become bald and presbyopic; his hearing has lost its acuteness; his sense of smell is definitely on the wane; his joints are enlarged, his muscles stiff and disobedient; he is either wholly or partly edentulous; his weight is a stone or more above that which he carried to the crest of the hill; he suffers from visceroptosis and habitual constipation, with the result that he has varicose veins not only in his legs but also in his rectum. It is said, and it may on the whole be admitted, that a large portion of this predicament is due to chronic intestinal stasis. The intestinal stasis, as we have already seen, means the absorption, or rather reabsorption, of fæcal and poisonous matters from his large intestine. The result of this poisoning is shown primarily in the work of the endocrine glands, for one of the chief tasks of the endocrine system as a whole is that of protecting their possessor from toxins of all sorts, whether they be of endogenous origin or exogenous. The toxins overwork the glands and lead to exhaustion. It would not be difficult to express each item of the "predicament" in

terms of this exhaustion of the endocrine glands. A mistake which is too often made in this matter is to regard each gland from too individual a standpoint. The endocrine system must be regarded as a hierarchy, a default in any member of which will reflect itself inevitably in some or all of the others. It is, of course, true that each gland seems to be charged with special functions, but it does not seem to be able to fulfil those functions unless its congeners are working smoothly. It is, therefore, no longer possible to consider with Lorand (1) that advancing years mean a modified myxœdema, nor with other writers that the suprarenals and the pituitary, or indeed the gonads, are alone at fault. A closer examination into the matter shows that, with one exception, all the endocrine glands tend to diminish both anatomically and physiologically as age advances; the one gland which usually shows a hypertrophy is the suprarenal.

Now a healthy and smooth and uneventful working of the endocrine system is essential to good health. It has been said with a considerable amount of truth that vitamins are to the endocrines what the endocrines are to the economy as a whole. It is, therefore, reasonable to argue that the decline on the part of endocrine activity, which is so conspicuous in the man of 50 of to-day, is due not only to an auto-toxis arising from his large intestine, but also, and perhaps mainly, to his deprivation in vitaminous foods. Premature age, then, is in the nature of a deficiency disease.

In the sorry state of the ordinary man of 50, therefore, we have to recognise a chronic intoxication which has been going on for about a quarter of a century, and that this chronic intoxication

is brought about primarily by an unsuitable dietary. I have already sought to explain that the excess of meat foods, cooked foods, and concentrated foods is responsible for much ill-health. The reason for this responsibility is to be found not only in the absence of vitamins from the dietary of the ordinary man; but even more perhaps in the substitution for vitaminous foods, of foods which are in themselves of a toxic nature. In the first few years of this chronic poisoning "the strength of nature in youth" may be trusted to neutralise or even nullify the effects of the toxins, but when continued over a period of five-and-twenty years the endocrine glands, starved of their vitamins, become exhausted, and little by little the toxins gain the upper hand. Thus it comes about that instead of being but a short way on his plateau at the age of 55, the ordinary man is already well on the downward slope. If he could only be made to recognise this fact and look steadily in the face the causes which have led to his undoing, and were to set about rectifying his faulty habits, he has still plenty of time in which to recover himself. But this he seldom does: he is not taught to do it.

I have already indicated to some extent what a man should not eat. I now propose to consider briefly what it is that he should eat. First of all, then, on general principles, let me once more repeat that man should eat natural foods. When the *genus homo* was created or evolved he was placed in a *milieu* where he could find his own sustenance, and this he found in roots and fruit and herbs and dairy produce: "locusts and wild honey." If he ate flesh at all, which he probably did, he ate it raw. Now in order to avoid the

toxins which trouble our large intestine and ultimately poison our endocrine glands, we must learn our lesson from primitive man. That lesson teaches us that the natural foods consist in uncooked vegetables, uncooked fruits, and dairy produce. This does not, of course, mean that a man should entirely confine himself to this type of nourishment, but it is to be remembered that if he eats a sufficiency of the things which he ought to eat, then he does not want—he certainly does not require—the artificial delicacies which come to him from the kitchen. The cult of unfired foods, as they are called, is regarded as a fad without scientific basis. Whether it be a fad or not, it certainly has a sound sanction in biology, and its cultivation leads in course of time to the disappearance of a very large number of symptoms which have hitherto been considered as the penalties of advancing age—arthritis, dyspepsia, hyperpiesis, and eczema, to wit.

We have to remember that the ordinary cooked foods of to-day are highly stimulating, more especially the meat foods, and that when they seem to lose their stimulating power the jaded organs are still further tickled and cajoled by sauces and pickles and other irritants of a similar kind. The tired horse is kept up to the collar with a goad. When a man accustomed to food of this nature turns into the paths of dietetic righteousness, he is liable to complain of a feeling of hunger. This is due entirely to the absence of the goad to which he has been accustomed. Another result of the absence of the stimulation is a certain amount of dyspepsia, usually of the asthenic type. The dyspepsia arises from the fact that the plain and non-irritating natural foods

fail to provoke the flow of gastric juice which the other foods evoked in large measure. A very little hydrochloric acid and pepsin in the first weeks of the new régime soon rectifies this difficulty, and at the same time causes the feelings of hunger to disappear.

I am in the habit of urging people who are past middle age to adopt the continental breakfast. If they miss the English breakfast too much at first, then I suggest toast and butter and honey and fruit, but I think the less that is taken in the morning the better for the patient. It is only a question of habit. The morning is essentially the time of excretion, and it is unwise to give the digestive organs more to do than is absolutely necessary; otherwise energy is withdrawn from the excretory organs to be transferred to the entirely unnecessary task of assimilation. Dr. George Oliver's work (2) on the effect of sleep on assimilation has not received the attention which it deserves. He showed that during sleep the tissues are irrigated with lymph, and that a large proportion of the whole amount of lymph poured into the tissues reaches its destination during the night season; assuming, of course a normal, sleepful night. It is a well-known fact that insomnia produces a far greater degree of emaciation than want of food, and produces it in a much shorter space of time. Also it has been observed that the most prominent effect of the artificially produced insomnia of the "fourth degree" is to give rise to an emaciation which is surprising both in its rapidity and extent.[1] Now, if during

[1] Shakespeare was evidently aware of this general truth when he put into Cæsar's mouth the words, "Let me have men about me that are fat . . . and such as sleep o' nights."

sleep the tissues are bathed with lymph, these tissues, in exchange, give up their excrementitious matter, which has to be marshalled and voided during the hours immediately succeeding sleep. The rule, then, to begin the day with as little food as possible is based on sound physiological principles. If food is taken at all, it should be the kind of food which our primitive ancestors took, namely, raw fruit or raw vegetables in the form of salad; either that, or some simple dairy produce, in small quantities.

The next meal, which is usually taken about one o'clock, should, on general principles, be a light one. In the first place, it is unwise to overload an organ which has been for some time in a resting state. In the second place, there is, as a rule, a considerable amount of brain work to be done immediately after the midday meal. During digestion there is a determination of blood to the stomach and duodenum, which means that in response to this local digestive call, blood is necessarily withdrawn from the brain. As the older physiologists put it, when a man is thinking "the little devils" are in the brain; when he is digesting, the little devils are in the stomach; and it is obvious that the little devils cannot be in both places at the same time. It is neglect of this very obvious truth which is responsible not only for the somnolence which so often overtakes people after lunch, but also for the dyspepsia from which so many brain workers suffer. The physiology of the situation is that, if a heavy meal be taken, then the Latin practice of a "siesta" after the meal should be followed; either that,

There is, further, the French saying, "Dormir, c'est manger," which proclaims the same neglected truth.

or the meal should be small in quantity and of such a nature as to make as few calls as possible upon the digestive energies. Bearing this in mind, then, he is a wise man who eats what has been aptly enough described as a " bread and cheese " luncheon. To these elements of bread, butter, and cheese there is no harm in the addition of an egg dish, either in the form of an omelette or otherwise. The only other things which should be permitted are salads of raw vegetables, and, to replace the statutory pudding, raw fruits and, if necessary, cream.

Salads in this country are apt to lack variety. They consist mainly of lettuce and cucumber. If people in general would be more exacting in this matter, there would be a very general response on the part of those who purvey this kind of food. A great many vegetables which are now eaten only in the cooked state are exceedingly palatable when made into salads. Setting aside such things as tomatoes, mustard and cress, watercress, and perhaps radishes, which are occasionally used, vegetables which are generally regarded as edible only when cooked, such as young cabbage, young carrots, chicory, brussels sprouts, nasturtium leaves and dandelion leaves, with parsley, onions, and beetroot, offer a large variety for raw salads from which suitable and very palatable selections can be made. To those who have never tried these things, the suggestion that carrots, cauliflower, nasturtium leaves, and turnip tops or horse radish should be eaten in the raw state seems very revolutionary, but I can assure anybody who may be prejudiced against them, that the majority of these vegetables are more palatable when raw than when cooked. Cooking deprives

them of their finesse. There is no objection whatever to using any kind of dressing which may be thought desirable.

The pudding stage should be represented by uncooked fruits, to which, of course, cream may be added, but not sugar. The taste for excessive sugar is a cultivated one, and, as has been already pointed out, is fraught with considerable danger to the integrity and efficiency of the metabolic agencies. Inasmuch as most of the articles just mentioned contain from 60 to 90 per cent. of water, it is not usually necessary to drink anything at this meal. Some people are more thirsty than others, and in the case of those who seem to require a large quantity of fluid, a glass of cold water before the meal, or hot water after the meal, flavoured with some lemon, is altogether unobjectionable. A cup of coffee is a pleasant stimulant, but it has the disadvantage of retarding the digestive processes. It is often said that raw fruits and vegetables give rise to indigestion, and in the case of people who have accustomed themselves to stimulating foods this is very likely to be the case. There is not, and cannot be, anything indigestible *per se* in these natural foods. The fault, when it exists, is not with the foods, but with the feeder, who has accustomed his stomach to unnecessary and deleterious stimulation in the material which he had been in the habit of pouring into it.

With a meal of the kind above suggested, a person is able to face his afternoon's work, not only without the somnolence and heaviness engendered by a full meal, but with that sense of refreshment which a suitable meal should cause in an ordinary healthy person.

The next meal should be dinner. Unfortunately people in this country have got into the habit of taking tea, bread, butter, and cake between luncheon and dinner. There is not, and there cannot be, any sort of physiological sanction for this practice. An ordinary meal, say luncheon, is said to take from four to five hours to leave the stomach, so that if the midday meal is finished at, say, two o'clock, the digestive works are not in the condition to receive any more food until about seven o'clock. Even this means that the unfortunate stomach is allowed no rest between its labours. Not content, however, with working this willing horse at high pressure, a totally unnecessary and highly indigestible adjunct is cast into the astonished organ between four and five o'clock in the afternoon. It may, in extenuation, be urged that tea is a pleasant stimulant and does as much good as harm. Such a position cannot be sustained. Tea, though a pleasant stimulant, tends, like coffee, to retard digestion; and then tea, as usually drunk in this country, connotes a certain proportion of sugar and milk, both of which must be regarded as foods which require to be dealt with by the digestive organs. But a cup of tea by no means comprises the meal which is called "afternoon tea": this usually includes bread-and-butter and cake—that is to say, a cruel combination of carbohydrates which places a severe and unnecessary burden upon the patient oxen of the alimentary tract.

For some curious reason, people seem to think of meals in terms of flesh foods. They certainly speak of them in those terms, and in those terms only. When asked to detail their daily intake, the vast majority will reply that they have bacon

and eggs for breakfast, a cut off the joint for lunch, and some fish and bird for dinner. The other things, the bread and butter and marmalade at breakfast, the potatoes and greens and puddings at lunch, and the various articles which go to fill up the interstices in an ordinary dinner, they never mention. It is the meat foods which seem to matter; not the carbohydrates; still less the fats and salts. For this reason it is to be supposed that people when eating a really enormous meal which they call "afternoon tea," regard it as something in the nature of a *bonne bouche* which matters nothing in the scheme of alimentation. It is essential to bring home to those who permit themselves the nefarious indulgence of this fantastically foolish meal that they are thereby doing despite to their digestive organs for which sooner or later a heavy price must be paid.

In the meal called "dinner," it is necessary to allow some latitude to the weaker brethren. Fish or fowl or game may be taken with cooked vegetables, even including potatoes. This should be followed by a fruit salad with cream, and rounded off with a savoury of cheese or something equally harmless. As I have already said, alcohol, if taken, should be reserved for the evening meal, and should then be taken in the strictest possible moderation. It is a rule which should never be broken that when the evening meal is over, nothing except water should be allowed to pass the lips before bedtime. The after-dinner cup of coffee so retards digestion in some people, though by no means in all, as to give rise to insomnia.

Insomnia, which is not due to definite disease, or to mental worry, may be expressed mathe-

matically by saying that insomnia equals indigestion. The type of insomnia which troubles the middle-aged is characterised by the fact that the patient goes to sleep, but wakes between three and four in the morning, and is unable again to do more than doze. This is purely a digestive matter, and is due either to excessive or unsuitable intake. The only drugs which are likely in any way to benefit such a symptom are sodium bicarbonate and other stomachic alkalies. To prescribe hypnotics for a condition of that kind is to treat the symptom without removing its cause.

While on the subject of insomnia, let me add this. Even when it is purely digestive in origin, it is a very troublesome condition to deal with. It gets on to a patient's nerves, as the saying is, and when he has suffered from this troublesome condition for a few nights, he is liable to suggest to himself that sleep has deserted him, and he becomes more and more apprehensive as the hour for retiring approaches. Apart from drugs, there are two methods of dealing with the situation, both of which are very efficacious. The one is to omit the evening meal altogether—that is, to eat nothing after luncheon. The other is a hot bath immediately before retiring, and if the hot bath can be supplemented by a certain amount of massage, so much the better. Such simple means should be accompanied by assurances to the patient that his insomnia is perfectly curable by natural methods, so as to remove the element of suggestion as rapidly as may be. In any case, hypnotics must be avoided as far as possible. If it should seem necessary to prescribe something of this nature, and with some people it is necessary,

then bromide of ammonium should be used. It is infinitely preferable to the synthetic drugs now so commonly employed. It does not create a habit.

This refers to simple or digestive insomnia. The insomnia of nervous excitement, of anxiety, and of pain, must, of course, be dealt with on other lines. Although it is easy to persuade ourselves that people sleep more than they think they do, we must not lose sight of the fact that even disturbed sleep has a very wearing and demoralising effect on the sufferer, and in the presence of real insomnia as opposed to digestive insomnia, the physician must not hesitate to use such means as are at his disposal for securing all-essential rest to the brain and nerves.

There has recently been some discussion as to the propriety of people drinking hot fluids. It is suggested that fluids of high temperature, not being natural, should not be taken in any form; that even tea and coffee should be taken either cold or at most tepid. One of the reasons advanced against the practice of drinking hot fluids of any kind is that people can train themselves progressively to tolerate these fluids until the temperature at which they are taken becomes actively irritating to the stomach and œsophagus. It is said that men, especially at breakfast, tend to gulp down their fiery fluids in the hurry to be off to their morning's work, and that this accounts for the fact that œsophageal carcinoma is more common in the male than in the female. To my mind the arguments in favour of this view are by no means convincing, but it would no doubt be well for physicians to warn their patients against the practice of drinking fluids at very high temperatures. If we adhere rigidly to the

formula of natural foods only, we should, of course, rule out all hot fluids, but if they are taken with judgment and understanding they certainly add to the agreeableness of certain meals, especially breakfast in winter-time, and need not be incontinently condemned.

To those who would object that the above scheme of daily dietary is ridiculously inadequate, I would reply that in comparison with the current dietary of the middle-aged, it certainly seems insufficient, but we have to remember that large meals are merely a habit, and that if we wish to combat the many ills to which middle-aged flesh is nowadays heir, it is necessary to alter the current dietetic habits so as to bring them into line with common sense. When natural foods are eaten regularly, after the passing of the initial period of hunger to which I have already referred, people usually settle down to regard the question of food in its proper perspective. Instead of thinking it necessary to eat four fat meals a day for dear life's sake, they come to accept food in its true light, namely, that of restorer of the flagging energies, and though they may enjoy the food in the eating, they prize it not for its palate value, but for its restorative properties. When a man has given up the foods of the city dinner type, he is surprised to find that his gustatory nerves, freed from constant over-stimulation, regain a delicacy of appreciation to which they have been strangers for many years, and he eventually learns to derive as much pleasure out of natural food as he did out of the items in the super-stimulating orgies which he had formerly considered essential to his continued existence.

The objects of such a dietary as I have

sketched above are two. The first is to prevent the ingestion of cooked and concentrated, and otherwise artificially prepared, food; the second, to secure the maximum of vitamins, salts, and catalysts. Unless it is realised that the presence of these three completely upsets all previously held theories on the subjects of the quantities of proteins, carbohydrates, and the other members of the caloric house of cards, it might be objected that such a dietary was physiologically, dangerously inadequate. Facts and experience—which there is no gainsaying—prove, on the contrary, that such a dietary is more than sufficient. Those embarking upon it for the first time may lose a certain amount of weight; on the other hand, many of those who were emaciated by physiological starvation on a full ordinary diet not only increase in weight, but gain in health and vigour.

I have purposely refrained from a detailed description of the vitamins, partly because our present knowledge of this important question is still in its infancy, but chiefly because the customary close and over-curious examination of the individual members is apt to obscure the importance of the concerted action of the group as a whole. The behaviour of individuals is interesting academically, but it is the influence of the group which concerns us physiologically and practically. We know that vitamins come from the vegetable kingdom, and that, save in the case of dairy produce, in so far as they are present in foods which come from the animal kingdom, their presence is purely fortuitous, because they represent such of these principles as happened to be unused in the body of the animal when it was killed. We also know that vitamins

reside in uncooked and natural foods, and scarcely, if at all, in cooked foods and artificial foods. High temperatures destroy them, and prolonged moderate temperatures do so even more effectually. That they are essential to our well-being has now been abundantly proved and, curious to relate, has been generally accepted. It is probable that they exercise their full effect only when they are provided in sufficient quantity for each to produce its proper reaction upon the other; for interdependent they certainly are. Their absence from our foods, even when this is relative only, causes certain easily recognisable conditions which are known as deficiency diseases, *e.g.* rickets, beriberi, and scurvy. There are, however, less well recognised morbid states which are due not to the conspicuous absence of one vitamin, but to a slight relative absence of them all, extending over a long period of time. It is more especially such conditions which tend to show themselves when man reaches his plateau, and the deficiency displays itself most readily in an exhaustion of the endocrine system. Hence the saying, "The vitamins are to the endocrines what the endocrines are to the economy."

The advent of these labile and elusive entities has exercised a profoundly disturbing influence upon those who dabble in theoretical dietetics. Practical physicians and sanitarians owe a deep debt of gratitude to Professor Gowland Hopkins, Professor Plimmer, and their co-workers, for having torpedoed the frail vessel which contained the precious cargo of proximate principles, "heat-producers" and "body-builders," with which our previous ignorance was cunningly camouflaged. And the debt is the heavier for the emancipation

which these pioneers have afforded us from the typically stupid Teutonic conception of " calorie " values. There was perhaps a good deal to be urged in favour of the theory of proximate principles in general, but in favour of its extension into heat producers and body builders there was nothing: it represented the arrogance of pure nescience. The calorie theory was even worse. It was begotten in a laboratory by a lump of sugar out of a retort, and we were asked to believe that the caramel thus engendered was the exact equivalent of the product of normal human metabolism.

It is high time that some one rediscovered the receptaculum chyli and the thoracic duct. When these are born again into the world of practical medicine we may come to realise that the products of digestion are actually poured straight into the blood and that, consequently, the composition of the blood depends mainly upon what we eat. If, over a long period of years, we eat an overplus of unsuitable food, and persistently neglect the foods which Nature intended us to eat, how can we expect the material which reaches the blood at the confluence of the left internal jugular and subclavian veins to be otherwise than toxic? We talk glibly enough of toxæmia, but we do not seem to be able to realise that the toxins are diligently ingested and carefully assembled in the receptaculum chyli for ultimate distribution to the endocrine glands and other vital structures.

In mitigation of this neglect of the receptaculum and the thoracic duct, it is useless to pray in aid the detoxicating diligence of the liver on the contents of the portal vein. The liver is unable to deal with all the toxins which our devitalised

foods introduce into the intestinal tract, especially when, stasis conniving, they are reinforced by the putrefactive products which they themselves create. This is obvious from the frequency and profundity of the toxæmias of so-called dyspepsia. It has been shown experimentally that if the portal blood is diverted directly into the vena cava so as to escape the attentions of the liver, toxæmia is the invariable result. This is precisely what happens in the case of the congested livers of gross feeders. The toxins, unable to meet the purifying influence of the liver, are assembled in the receptaculum to be conducted by the thoracic duct into the general circulation. These considerations ought surely to furnish some emphasis as to the importance—now so sadly neglected—of ingesting natural vital foods free from the reproach of putrefaction and decomposition.

It is conspicuously at middle age that endocrine disturbances tend to make themselves felt. In woman, the reason for this is obvious; the disappearance of her ovarian hormone upsets the balance of the whole system, which it takes some little time and no little tribulation to re-establish. In the case of man there is no such obvious reason. When his endocrine system begins to default, it generally does so *en bloc*. Some one gland may seem to be the most prominent defaulter, but that is only because it was originally not very well developed. The dying down of the whole system which takes place at this period is the manifestation of a chronic auto-toxis extending over a number of years. The history of a case of myxœdema in the male, for example, will reveal no sharp line of demarcation between vigour and indolence; the change is a gradual one;

it may be accelerated by an acute infection, but the result of the infection is merely to hasten the alteration ; it does not determine it.

In seeking to inaugurate a change in the present deplorable dietetic habits of the majority, we have to realise that it is by no means an easy matter, even for those who are willing, to limit the amount and alter the nature of an intake to which they have become accustomed. The stumbling-block, and a very formidable one it often is, is presented by the female of the species. Even those women who are themselves abstemious to the point of asceticism, are nevertheless obsessed by an instinctive desire to " feed the brute." Whether the brute be husband, son, or brother, he must, at each meal, be fed to the limit of his stomachal capacity. The underlying idea is that it makes " the brute " good-tempered — this I have elicited by much cross-examination. Of course nothing could be more fallacious. Full meals may render the " brute " good-tempered for the time being, but in the long run such a policy cannot fail to produce exactly the opposite effect. But we have to deal with things as they are, and when face to face with an overfed " brute," who cannot, because he dare not, simplify and limit his intake, it is well to attack the problem from the other end by seeking acceptable means for increasing his output. To overload the intake and accelerate the output is no doubt to place a considerable strain on the organism, and constitutes a policy of very poor second-best. But what can be done to work off the excess of ingested food should be done, by insisting upon such means as muscular exercise in the open air and free evacuation from the *primæ viæ*.

Apart, however, from any question of excessive intake, the element of adequate elimination is one which should most earnestly engage our attention during the whole of man's sojourn on the plateau, and engage it with increasing solicitude as his pilgrimage advances. The principal emunctories are, of course, the bowels, the kidneys, the skin, and the lungs. Even at the risk of being charged with wearisome repetition, I must refer in some detail to the question of intestinal stasis as expounded by Sir William Arbuthnot Lane. This seems necessary in view of the fact that this pioneer's work has been so much misrepresented by stupid critics, whose sclerosed cerebral arteries prevent them from rising superior to their prejudices, that its value is in danger of being obscured by the fog of futile and irrelevant faction. Of the essential soundness of Arbuthnot Lane's main contentions there can no longer be any shadow of doubt, and the sooner they are appreciated at their true value the better for the credit of the profession as a whole. His teaching may be divided into two parts : the first is mechanical ; the second, which depends on the first, is physiologico-pathological. They may be epitomised as follows. The effect of long-continued constipation is to cause distension of the colon, which, in weakly subjects, results in a lengthening of the tube ; in more vigorous subjects, in the formation of supporting bands. In course of time these bands contract and give rise to kinks in the bowel, causing a relative stasis of its contents. The kinks favour particular situations. The most important of them, Lane calls the " first and last kink," because it is the first in point of time and the last in point of anatomical situation. Another

very important kink is one which frequently occurs at the junction of the ileum and cæcum, and is due to a " controlling appendix." This kink leads to a damming back of the contents of the small intestine and a consequent stasis in the ileum. This is important because many people appear to think that the evil effects of intestinal stasis arise from a stasis which is confined to the colon.

The secondary mechanical effects are due to the toxins which are reabsorbed from the static material. These toxins weaken the voluntary and involuntary muscles. Among the first of the voluntary muscles to be thus affected are those which raise and expand the thorax, with results upon its contained viscera which are not difficult to imagine. A side effect of this is the relegation of the respiratory effort to the diaphragm, whose over-action tends to cause a descent of the abdominal viscera. The weakness of voluntary muscles in general leads to the exaggeration and fixation of the normal resting postures. Thus are caused dorsal excurvation, flat-foot, lateral curvature, and knock-knee, which, in their turn, according to F. Wallis, are important factors in the causation of piles. These mechanical troubles are thus directly due to the auto-intoxication to which the stasis gives rise.

So far as the involuntary muscles are concerned, the stasis causes the muscular coat of the alimentary tract to become seriously atonic, with the natural consequence of emphasising the stasis and the establishment of a vicious circle. Mr. Chapple is satisfied that a close relationship exists between uterine disease and intestinal stasis. It is satisfactory to have this statement from a distinguished authority, although a very little con-

sideration would convince any thinking person that organs situated inside the pelvis could hardly escape some deleterious effects from their neighbourhood to an overloaded and toxic bowel. Another high authority, Sir James Mackenzie, believes that cardiac degeneration is promoted, if indeed it be not caused, by the toxæmia to which the stasis gives rise. Every one now recognises that toxæmia of the cardiac muscle is a frequent cause of dilated heart.

The secondary effects of the intestinal stasis, those, namely, which are due to the toxæmia set up by the reabsorption of poisons from the tract, may show themselves in almost any of the great systems, chiefly perhaps in the kidneys, which are obliged to excrete matters with which they were not originally fitted to deal. Further, the poisoned and poisonous blood passing through the portal system would certainly give rise to troubles in the liver and in the pancreas, eventually causing degenerative changes in these organs. The nervous system, of course, could not escape some serious effects when the nutritive fluid with which it is bathed, is charged with foreign toxic material. Hence arise headaches, rheumatic and neuralgic pains, depression, irritability, and lack of energy. The full effect upon the nervous system, though somewhat neglected at first, is in process of securing general and emphatic recognition. Alienists are now alive to the fact that chronic stasis may account for a very large number of cases which they are called upon to treat, and the testimony to this effect from all countries is rapidly increasing. Ainslie Walker, discussing this question,[3] cites the three following passages from the writings of leading American alienists :

" Hamill and Blackfan, writing in the *Journal of the American Medical Association* as long ago as 1910, remark :

" ' The relationship between chronic disturbance of the intestinal digestion and convulsive seizures cannot be too strongly emphasised. It is almost criminal to assume that because any child has had a series of convulsive seizures lasting over a period of months, or even years, it is necessarily epileptic. Such an assumption is a most liberal contribution to the *production* of epilepsy. The frequency with which it can be traced to these chronic conditions of the intestinal tract will be surprising and enlightening.'

" Again, Hill, in the *Transactions of the American Medico-Psychological Association*, wrote in 1905 :

" ' There is no question in my mind about the influence of auto-intoxication, not only in epilepsy, but in all forms of mental disturbance, not excepting paranoia.'

" Kemp similarly expresses himself in the same journal in 1905 :

" ' Epilepsy,' he writes, ' without question, may be in some cases directly attributable to auto-intoxication from the intestinal tract. . . . Many nervous conditions—neurasthenia, mental depression, and melancholia—can be imputed to auto-intoxication. Mental depression often accompanies or is a symptom of toxæmia, and this condition may even progress to depressive insanity.' "

When we consider that the lymph spaces and the tissues generally are, so to speak, manured, as a sewage farm is manured, by the circulation of a fluid calculated to promote the growth of lower organisms, it is not surprising to find that bacteria of every kind find a happy hunting-

ground in any of the tissues of a person suffering from intestinal kinking.

For some curious reason, the activity of bacteria or the absorption of toxins seems to give rise to the disappearance of normal fat in the body. At any rate, an absence of normal adipose tissue is an almost constant accompaniment of pronounced or long-continued stasis. This loss of fat favours the prolapse of the abdominal viscera. It is known that it is the peri-renal fat which is largely responsible for keeping the kidneys in their proper places, and when this fat is for any reason reabsorbed, the kidneys, especially the right kidney, drop into the lower abdomen, reaching sometimes as far as the pelvis. This not only causes angulation and obstruction of the ureters, but also engorgement of the kidneys themselves. The floating kidney, of which we used to hear so much a generation ago, which rested on the hard floor formed by the iliac fossa and was sensitive to every movement, was a result of this reabsorption of peri-renal fat, and was undoubtedly originally due to intestinal stasis.

It would be easy to multiply instances of the baneful results of what has been called Lane's disease, but it is unnecessary. The principle, once grasped, leads inevitably to the conclusions which he has formulated, and it becomes easy for the veriest tyro to appreciate the significance of his work. This brief résumé by no means comprises all the counts in the indictment which Lane has so successfully brought against the maleficent effects of stasis. His book deserves to be carefully studied by every one.(4)

When once one's attention has been called to the existence of Lane's disease, its clinical

symptoms are not difficult to recognise. The most prominent of these are found in the skin, which in its endeavour to get rid of the effects of the poisons becomes moist, and in certain situations, such as the axillæ, is liable to exude a fæcal odour. The integument itself becomes inelastic and pigmented, especially where it is exposed to any pressure or friction. I have known a young man suffering from pronounced chronic intestinal stasis to be so generally and deeply pigmented as seemingly to justify a diagnosis of Addison's disease. The depression in the vitality and resisting power of the skin renders it liable to be invaded with various organisms, with the result that acneform and other eruptions are by no means uncommon. The dermic appendages, hair and nails, very readily reveal the effects of this chronic toxæmia. Scurfiness or greasiness of the hair is exceedingly common, as is its rarefaction over the temples and elsewhere. The nails tend to become coarse and unsightly, with longitudinal ridges and badly formed half-moons.

In the chronically constipated the ears are usually congested. Their colour becomes from two to three shades deeper than that of the face, and they are tinged with a blue or purple hue. This is exceedingly characteristic ; the only other cause producing the same effect is the habitual wearing of a tight collar. That, however, congests the whole head and face, and does not produce the striking difference between the ears and the rest of the face which characterises the result of chronic intestinal stasis in this area.

The breast behaves in a characteristic manner in auto-intoxication, so much so that it may be regarded as the barometer of the degree of poison-

ing. At first it presents induration, which commences in the upper and outer zone of the left breast, extending subsequently to the entire organ on both sides. In the absence of treatment, cystic or other degenerative changes are liable to ensue.

Varicose veins in the rectum, commonly called hæmorrhoids, and varicose veins in the scrotum, commonly called varicocele, though they may own other causes, are, in the vast majority of cases, due to the obstruction of the venous return provided by a chronically loaded rectum. The same is true of ordinary varicose veins in the lower extremities. The extraordinary recuperative power of veins whose valves have to all appearances been badly damaged is to be seen in women after childbirth. When the obstruction caused by the pregnancy is removed, the varicose veins completely disappear, assuming, of course, that the obstruction is not kept in being by intestinal causes. This recuperative power is also seen in the many cases of varicocele which disappear "spontaneously." On inquiry it will usually be found that the "spontaneity" has been furnished by the correction of a chronic constipation which, as is so often the case, was wholly unsuspected by the patient. The person who goes regularly to stool in order to empty the last three inches of his intestine, and returns with the satisfied smile of something accomplished, something done, is usually the subject of varicose veins in various situations below the waist-line. His smile generally gives place to an expression of incredulous astonishment when the truth is brought home to him. Unless hæmorrhoids are of very long standing, an operation for their removal is seldom

necessary. What requires removal is the obstruction which causes them; the intestinal stasis, to wit. When this is accomplished, the piles will cure themselves with the aid of some such simple assistance as that afforded by Ung. gallæ c̄ opio. Before more drastic measures are advised even in bad cases, a trial should be made of the method of submucous injection of the piles. The details of this little operation were recently well described by Graeme Anderson,(5) whose paper is deserving of careful study. (See also Morley's excellent book.)(6)

Colitis is another condition which is often spoken of with bated breath as though it were a perverse primary entity. It is only perverse when its cause is not removed, for it is never primary. It is secondary to improper feeding and intestinal stasis. When these are rectified the colitis disappears.

Surgical measures[1] apart, the treatment of intestinal stasis resolves itself into dieting the patient on lines to which I have already referred. Such a diet not only restores the activity of the intestinal musculature, but ensures that the retained material shall be as little poisonous as possible. Of active therapeutic measures, drugs which promote fluidity or, at any rate, relative fluidity, of the intestinal contents are to be preferred to the more ponderous purgatives. Sulphate of magnesium, sulphate of sodium, and phosphate of sodium are all very useful drugs, and they may be given over a long period of time without any ill

[1] It is a great misfortune that the title of Lane's book should suggest that the subject is therein approached from the surgical standpoint only, for such is by no means the case, and the suggestion prevents many people from reading the work who would very much benefit by the knowledge therein contained.

effect. They have, moreover, the advantage of supplying chemical elements which are essential to us. Cascara is a popular remedy to which no objection need be taken. Where a person has become thoroughly poisoned, I usually advise mercury, iridin, podophyllin, or some other hepatic stimulant, to be taken at least once a week during the first few months of the treatment. This enables the liver to get rid of the accumulated toxins, and restores to this important organ the capacity for performing the antiseptic tasks which have been allotted to it by Nature. Arbuthnot Lane, and others, have spoken highly of paraffin in the treatment of this condition. Much may be said for this remedy, because it facilitates the passage of the fæces past the dangerous kinks, but I confess to being disappointed with it on general grounds. It seems to me to clog the mouths of the intestinal glands and thus give rise to a retention of the normal lubricants. This effect seems to be less pronounced in the aged than in the ordinary adult. In old people, certainly, paraffin is an efficient and altogether unobjectionable laxative, but in the case of younger people, with plenty of recuperative power, I prefer measures directed to the re-education of the normal means of evacuation. A drug which the present generation seems unduly to neglect is ipecacuanha. A quarter of a grain of the powder will be found exceedingly useful, especially when combined with a quarter of a grain of the extract of belladonna, made into a pill with half a grain of aloin.

And as with paraffin, so with the abdominal belt. This contraption is better than visceroptosis and its attendant stasis, and is tolerable when

there is no longer any prospect of re-educating the abdominal muscles to do their own work. But then and then only. Re-education should be insisted upon whenever possible. Belts, like crutches, should only be used in emergencies.

The modern water-closet, for all its sanitary perfection *vis-à-vis* the community, is grossly defective *vis-à-vis* the individual, because it deprives him of the mental stimulus of the uplifting vision afforded by the result of his peristaltic labours. Nor is this its only crime. That its fathomless depths should deprive man of the satisfaction of ocular appreciation is bad, but it is almost worse that its height from the ground should paralyse his abdominal muscles. These muscles are little enough exercised by sedentary man, but when seated on the ordinary everyday water-closet he could not exercise them even if he would. A chair or a tall footstool may yield him salvation by raising his knees, but if the basin itself were properly constructed, these adventitious and easily neglected aids would not be necessary. The practical sanitarians, who have placed this generation under real obligations, should extend their energies to the standardisation of a rational and physiological closet.

Chronic intestinal stasis and its effects are very well treated at some health resorts, chief amongst which are Carlsbad, Brides-les-Bains, and Plombières. The last named is a pleasant station in the Vosges Mountains, situated at an altitude of 1300 feet in a rather narrow valley. It has given its name to a system of irrigation of the large intestine, which has been copied by a good many other health resorts, and can be obtained not only at Bath, Buxton, Harrogate, and other

spas in this country, but also in most of the large towns. The treatment is usually very efficacious in ridding the large bowel of accumulated masses of fæces and inducing an element of wholesome cleanliness. Also, it aids in re-educating the intestinal musculature. Carlsbad, situated in Czecho-Slovakia, was the pioneer in the treatment of gastro-hepatic conditions by the drinking of the now famous Sprudel salt water. It is, in fact, a treatment by purgative waters, the principal ingredients of which are sulphate of sodium and the bicarbonate of sodium, with a small proportion of common salt and carbonic acid gas. The neighbouring town of Marienbad deals with much the same kind of cases on similar lines. Practically the only difference between the waters of the two stations is that those at Marienbad are cold, while those at Carlsbad are hot. The accommodation at both these places is good, and the general atmosphere such as to promote an effective "cure." The other spa where such cases are undertaken is Brides-les-Bains, in Savoy. This is a resort which is very pleasantly situated at about 1860 feet above the sea. The waters are not so strong as those at Carlsbad or Marienbad; but they contain sulphate of sodium, sulphate of magnesium, and common salt, in quantities sufficient to bring about much the same effects as those to be obtained at Carlsbad and Marienbad. Before the war the accommodation at Brides-les-Bains left a great deal to be desired. This has now, however, been remedied by the building of a new hotel which is quite up to the standard demanded by English and American visitors. The water used for bathing at the neighbouring town of Moutiers is rich in carbonic acid gas, and

is useful in cardiac conditions and cutaneous affections. Brides has the great advantage of being associated with a station called Pralognan, situated above Brides at an elevation of about 5000 feet. In these days of motor-cars, it offers an easily accessible and very charming spot for an after-cure.

The next most important emunctory demanding our attention is the kidney. It is well known that the end-products of protein metabolism are voided by the renal route. It is therefore of the first importance that this route should be kept clear and in good working order. The fault which most people commit in their ordinary daily lives is to drink too little fluid. How great a fault this is, may be brought home to us by reminding ourselves that all the essential vital processes are performed in a fluid medium. Affections of the kidney are often indirectly brought about by what may be called stasis in that organ. I have already mentioned that on the present scheme of dietetics, and owing to the extraordinary prevalence of chronic constipation, work is imposed upon the kidneys which both in degree and in kind is quite unsuited to them—work for which they were never designed, and which in the long run must necessarily fatigue and damage their delicate constitution. The extraordinary popularity of urotropine, which is only a form of the powerful antiseptic formalin, bears eloquent testimony to the degree of intoxication to which the kidneys are subjected by present-day conditions. To be obliged to call in the aid of this antiseptic is to proclaim the faultiness of our dietetic habits.

Functional diseases of the kidneys, which are

grouped under the rather vague term "renal inadequacy," are very well treated at certain health resorts, notably Evian-les-Bains, on the Lake of Geneva, and the three spas situated close together in the Vosges Mountains, namely Vittel, Contréxeville, and Martigny. These four places undertake the disinfection not only of the urinary tract, but of the bodily fluids generally. They claim to "flush out" the blood. This process of debarrassing the vital fluid of its accumulated toxins by cleansing the kidneys can be undertaken to some extent at home, by drinking plenty of water, to which a salt of potassium may profitably be added. But, as in the case of the bowels, it is better that treatment of this kind should be undertaken at a spa where patients seem to submit themselves more willingly to dietetic and other restrictions.

The skin seems to be the emergency excretory organ *par excellence*. Its primary function is no doubt that of regulating heat production, and when it is employed by Nature as an excretory organ it means that the body is over-burdened with excrementitious matter, the voiding of which cannot be undertaken by the bowels and kidneys. This is the probable explanation of the flushes and perspirations which occur at the menopause. A man in good training seldom perspires; the balance between his intake and output is at the right level. If he should increase his intake while decreasing his output for two or three weeks, and then resume his muscular activity, he will invariably perspire unduly until the balance is once more redressed. Certain substances having a toxæmic effect appear to be more readily excreted by the skin than by any other route, which, as

we have already seen, applies especially to the toxins which originate in the intestinal tract. Apart, however, from its power of active excretion, the skin appears to have the property, through its nerve endings, of stimulating metabolism in such a way as to bring about a complete oxidation of matters which have been only partially oxidised, and thus of ridding the system, through the ordinary channels, of substances which are deleterious to the economy. The treatment which is applied to gouty and other insufficiently metabolised individuals at spas produces its effects by calling in the aid of this property of the integument. By means of baths, massage, electricity, exercises, and the like, the temperature of the body is raised, and the nerve endings are stimulated. A hot wet pack, for example, or an electric light bath, will raise the body temperature in the mouth by $1\frac{1}{2}^\circ$ to 2° F. Such procedures act in the same way as fevers act—that is to say, undesirable matters present in the blood and tissues are oxidised into such a form as enables them to be readily excreted.

One of the most interesting and far-reaching properties of the skin, which has recently been studied very carefully, is its reaction to sunlight. Sunlight was first used in a rather empirical manner at St. Moritz; it was then taken up by Dr. Rollier at Leysin and Sir Henry Gauvain in this country, in whose hands it was so successful that, at the instance of Professor Leonard Hill, an investigation into the matter of heliotherapy generally was undertaken by the Medical Research Council in this country. So far as our knowledge goes at present, there would seem to be a very wide range of usefulness for sunlight or its

artificial substitute in the cure of disease. What exactly takes place it is not yet possible to explain, but Professor Leonard Hill, Sir Henry Gauvain, and their collaborators seem to be of the opinion that in sunlight we have a means not only of detoxicating the bodily fluids, but of rousing metabolism in such a way as to bring about healthy action in diseased tissues. The results so far obtained in the various kinds of cases which have been subjected to artificial sunlight are sufficient to raise high hopes of its usefulness in a wide range of diseases. There are some points, however, which require considerable caution when appealing to the curative properties of direct sunlight. To begin with, direct exposure must be gradual; a sudden exposure of the whole body to the direct rays is liable to bring about very unpleasant symptoms. Another point is that it is the light of the sun, and not its heat, which produces the beneficial results. Exposure should therefore take place either in the early morning or the late evening, never when the sun is at its meridian. A third important point would seem to be that the body should, as far as possible, be kept cool during the exposure. The combination of heat with sunlight appears to retard the curative effects of the latter. It is fortunate that Professor Leonard Hill and his coadjutors have been able to produce an artificial lamp which sends out the particular rays of the spectrum which hold the healing powers. These lamps can be obtained at a relatively small cost, and a good many patients may simultaneously be subjected to the rays which they emit.

There can be no doubt that the work of helio-therapy is opening a new chapter not only in

therapeutics, but in the reasonable promotion of healthy metabolism.(7) Sir Henry Gauvain, who has been one of the principal pioneers in this matter in this country, delivered a lecture at the British Medical Association,(8) on August 9, 1924, in which he explained very clearly the stage at which the new and fascinating science had arrived. He insisted that sunlight, being a very powerful agent in the prevention and arrest of disease, is naturally fraught with considerable danger when prescribed indiscriminately. He classifies the dangers under two heads: first, those due to carelessness or ignorance; secondly, those due to the unsuitability of the individual.

"1. The most obvious dangers under this head are sunstroke, heat-stroke, and sunburn. The former is produced by local heating of the brain as well as by general heating of the body, while heat-stroke is caused wholly by the latter. Professor Leonard Hill and Dr. Argyll Campbell have shown that by placing the head end of a rabbit in the sun, and the tail end in the shade, the temperature of the brain may rise several degrees above that in the rectum. The circulation of blood is not sufficient to distribute the radiant heat locally received equally round the body. If the brain temperature rises too high, death may result. Hence the need of suitably protecting the head and the spinal column, particularly in the tropics. Heat-stroke is preceded by fatigue of the sweating mechanism on which the heat regulation of the body depends in hot atmospheres. Such fatigue and failure to sweat is accelerated by illness. Heat-stroke can be warded off by induction of artificial sweating, by wetting the patient with a spray and blowing upon him with a fan. Heat-stroke is especially prone to arise in windless hot atmospheres, and in overheated

conditions. Sun-burning may contribute to the onset of sunstroke or heat-stroke, by making the subject ill through absorption of the produce of damaged tissues. The blister which results in extreme cases of sunburn may leave an open sore which in turn may become infected and is thus a source of danger. Sunburn should always be avoided. I hold a nurse who allows her patient to develop a sore in consequence of sunburn in equal disgrace with a nurse who permits a sore to form on a paralysed limb through lack of care. By carefully graduated exposure such sores may be avoided; they do not occur when the skin has gradually become well pigmented and chocolate-coloured. In some patients with limited pigmenting power they may be difficult to avoid unless extreme care and skill are exercised.

"2. Dangers due to unsuitability of the individual exposed are more difficult to describe, and in certain cases can only be ascertained by undertaking complicated tests. Subjects who will not pigment, or who freckle, but do not pigment well, should only be exposed under medical advice and with meticulous care. Albinos are unsuitable for sun treatment. In them the protective pigment so useful in undertaking the sun cure will not form. Briefly and for general guidance it may be said that the very young, the aged and infirm, people suffering from any illness or organic disease, should never attempt sun treatment except under medical advice. For many of these sun treatment may be of the highest value, but there are dangers in its application, so great, that treatment should only be undertaken by those expert and trained in its use."

Sir Henry Gauvain then proceeds as follows:

"Patients responding suitably to insolation are extraordinarily immune to colds and catarrh, not only when receiving treatment, but their

resistance is so raised that this immunity usually remains for a considerable time after treatment is completed. Coughs and colds are almost if not quite unknown amongst my patients at Alton and Hayling Island."

Sunlight, Sir Henry Gauvain tells us, has a powerful direct bacterial action. It has been described as the world's greatest antiseptic. This property is possessed mainly by the ultra-violet rays of the spectrum. Another interesting property of these ultra-violet rays is their effect in promoting calcium metabolism. They would also seem in some way to redress the balance of a diet which is deficient in vitamins. These rays would then appear to have a very close association both with the endocrines and the vitamins. The question of pigmentation which is here seen to be of so much importance is certainly connected with the glandular systems, chiefly so far as we know at present with the adrenals and pituitary. The lecturer closes with yet another grave warning which reads as follows :

" Certain of the properties of the ultra-violet rays on the body have been ascertained ; notably the recent discovery of their ability so to influence the blood, after due exposure of the skin, that its power to destroy disease-producing organisms may be greatly increased. This is a property of the greatest interest and value. It affords an explanation of the beneficial effect of sunlight on septic conditions. Hæmo-bactericidal power after insolation, though commonly raised, may be occasionally lowered, and this is an additional reason why insolation should be applied under medical direction, as in certain conditions lowering of the bactericidal power of the blood may just turn the balance and result in great harm to the

patient. For the discovery of this property of ultra-violet light credit must be given to Professor Leonard Hill, working with Dr. Colebrook and Dr. Eidinow. It is, I think, one of the most important discoveries made in recent years, and likely to have profound significance in therapeutics. From clinical considerations one felt that such a result must be produced, but it needed the skill of these investigators to demonstrate it. Here I would especially pay a warm tribute to the brilliant investigations of Professor Hill."

This is all the more pertinent having regard to the fact that artificial sunlight produced by lamps will shortly be available for use, even in humble households. A book by Dr. F. Howard Humphris,(9) which has just appeared, should afford enormous help to the many who are anxious for all the available information on this fascinating subject.

The excretory power of the lungs is mainly confined to the discharge of carbonic acid gas, but it is also capable on emergency of dealing with other matters. This is evident from the state of the breath of alcoholics and some drug-takers. The proper and, indeed, the only way of cleansing the lungs is by the inhalation of fresh air, and this can best be obtained by vigorous exercise in the open air. As will appear in Chapter V., one of the best means of " washing out " the lungs is to be found in a sojourn at a high altitude. This pulmonary lavage is presumably the reason for the " rejuvenating influence on every organ of the body from the brain to the skin," which Sir Hermann Weber (10) believed to ensue from " a walking or climbing tour of three to four weeks in mountainous districts."

As they arrive at the far end of the plateau

all men tend to become stereotyped in their mental processes and are apt to be impatient of new ideas. I think medical men manage to retain their elasticity rather better than members of other professions, but they are usually sadly thwarted in their desire so to do by the progressive nature of medical work in general, and by the changes in nomenclature which advances necessitate, more especially on the physiological side. We are often so sorely hampered by our ignorance of these changes in nomenclature as to render the text of an otherwise illuminating article quite incomprehensible. As there must be a great many medical men who are unable to lay their hands upon the necessary keys to such comprehension, I have ventured to transcribe here an admirably lucid disquisition on the subject of the present conception of acid and alkali, which I cull from "The Periphery" of the *Medical Press and Circular* of August 20, 1924.

"Our conception concerning the reaction (*i.e.* the acidity or alkalinity) of fluids has undergone considerable modification within recent years, and we are now able to estimate and to record in terms of ionic concentration (=PH) the degree of acidity or alkalinity of a fluid with a precision and accuracy not before possible.

"This is a great gain to chemistry, more particularly to bio-chemistry. It is now known that every independent mass of bioplasm, be it a bacterium, protozoon, or tissue-cell, as well as every enzyme (*e.g.* pepsin), and every endocrine, functions best in a fluid of particular ionic concentration known as the optimum. Hence the value to the bacteriologist and physiologist of having at their disposal an accurate means of estimating ionic concentration.

" When an acid such as HCl is dissolved in water only a very small proportion of it persists as molecules of HCl. Most of the molecules are ionized into H and Cl ions. The H ions are atoms of H which have lost an electron and thus are positively charged, while the Cl ions consist of atoms of Cl which have gained an electron and thus are negatively charged. The acidity of the HCl solutions, as of all acid solutions, depends upon the number of H ions it contains in a given volume of the solution. The more readily H ion dissociation occurs, the stronger the acid.

" Bases depend for their properties on Hydroxyl (OH) ions. All acid solutions contain some OH ions, and all alkaline solutions some H ions. Solutions which contain an excess of H ions are acid ; those which contain an excess of OH ions are alkaline. When the H and OH ions are in equal numbers the solution is neutral. Pure water is slightly ionized into H ions and OH ions, but the two being equally balanced the reaction is neutral.

" Inasmuch as the H and OH ions in a solution bear a definite relation to one another, it would be possible to express the reaction of a solution in terms either of H ions or OH ion concentration. The former method is chosen. The PH, *i.e.* the H ion concentration, of pure water is represented by 7. The numbers from 7 to 1 represent an increasing degree of acidity, PH 1, thus indicating the highest degree of acidity ; those from 7 to 13 represent an increasing degree of alkalinity, PH 13 indicating the highest degree of alkalinity.

" The hydrogen ion concentration (PH value) of a solution is most conveniently tested by means of a series of ' coloured indicators,' each of which is changed to a characteristic colour by a PH ranging between definite narrow limits. Thus thymol blue changes to red and yellow between a 1·2–2·8 range of PH ; bromphenol blue from

yellow to blue between 2·8–4·6 PH; phenol red from yellow to red between 6·8–8·4; thymol violet from yellow, blue, to violet between 9–13.

"A substance which resists a change of PH on the addition of acid or an alkali is said to exert a 'buffer' action. Such buffer substances play an important part in maintaining a constant PH (or at least one varying within narrow limits) in the varying fluids of the body, each of which has an optimum PH, *i.e.* a degree of H ion concentration at which it can function best. Thus, were it not for the presence of such buffer substances as the bicarbonate and protein of the blood, the entrance of a small quantity of acid into that fluid would increase its PH to a degree which would cause symptoms of acidosis.

"The method of recording the reaction of a fluid by the PH formula renders it possible, as I have said, to indicate precisely the reaction of the various body fluids. Thus the PH of pancreatic juice is found to be 8·3, of blood, tears, and human milk 7·4, 7·2, and 7·1 respectively, *i.e.* they are slightly alkaline; the PH of saliva and cow's milk are given as 6·9 and 6·7, *i.e.* they are faintly acid; that of adult gastric juice is 0·9–1·6, *i.e.* strongly acid.

"Every micro-organism grows best in a medium having a definite PH. The optimum for *Bacillus coli* is PH 5, that of yeast 2·5. By regulating the PH of the culture medium it may be possible to favour the growth of one species of organism and check that of others.

"As regards enzymes, trypsin functions best in a PH 8 medium, pepsin in a 1·4 medium.

"The sharpness of beverages depends upon their acidity. The PH of lemon juice is 2·2, of wines 2·8–3·8, and of beers 3·9–4·7.

"As regards the influence of PH on vitamins, it is known that vitamin C only remains stable in an acid medium.

" Milk straight from the cow is almost neutral, its PH being 6·8, but it becomes acid with the growth of lactic-acid-producing bacilli, curdling when the PH reaches 4·6.

" The growth of the larger plants, like that of bacteria, is largely influenced by the PH of the culture medium (in this case the soil), the optimum differing for different species of plants. As is well known, gardeners and agriculturists add lime to the soil when it becomes acid."

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CHAPTER III

THE ENDOCRINOLOGY OF THE PLATEAU

In order to understand the functional changes which take place when man is on his plateau, we must glance briefly at the present position of endocrinology as a whole. In doing so we shall be surprised to find the very great importance which this branch of science has come to occupy in our outlook on clinical problems.

The system which distinguishes the *genus homo* from the other vertebrates is the central nervous system; brain, and spinal cord. The other nervous system, the sympathetic or autonomous, he shares with the beasts, from whom, indeed, he inherits it. The central nervous system being the apex, as it were, of the evolutionary process, is a very highly organised and very delicately balanced system. For its complete development, both time and the undivided energy of the whole organism are therefore required. In the absence of any special means to this end, the somatic tissues, muscle, bone, etc., will develop at the same rate as the central nervous system, and the adult stage, when no further growth is possible, will be reached before the brain and spinal cord have had time to perfect themselves. It was for this reason, apparently, that certain retarding glands were conferred upon the *genus homo*. In the thymus and

pineal we recognise two of these retarding glands. There may be others. Now the part which these glands play in the development of the organism is that of retarding or holding back the development of the somatic tissues until the central nervous system has been given a good start, as it were. This holding back of the somatic tissues proceeds in a diminishing degree until puberty, at which point, by the setting free of the gonads, full rein is given to the elaboration of the hitherto enleashed somatic tissues. It is at this point that the endocrine pattern of the individual is finally determined. By endocrine "pattern" is meant the relative importance which the glands of the endocrine system come to bear to one another, and, by implication, to the individual as a whole. If, for example, the liberation of the gonads has a special repercussion upon the pituitary, stimulating the latter in greater measure than it stimulates, say, the thyroid, or the adrenal, the result will be something in the nature of a giant, with over-developed osseous system and rather under-developed intelligence and character. Moreover, this initial over-stimulation of the pituitary will mean, later on, its relatively early exhaustion, so that, at a time of life when the individual ought to be at his prime, he is liable to show evidences of pituitary insufficiency due to a relative exhaustion of the gland. Or, to take another, an opposite, case; if the freeing of the gonads exercises an undue repercussion upon the suprarenals, there would result a man of small stature with considerable development of hair on his trunk, well endowed with energy and perhaps over-burdened with sex and combative instinct.

In considering the adrenals, we have to recog-

nise that these glands are the *officiers de liaison* between the endocrine system and the autonomous or vegetative nervous system. Now, this autonomous or vegetative nervous system consists of two great divisions.(1) On the one hand, there is the sympathetic; on the other, the para-sympathetic or extended vagus. The sympathetic system is katabolic; it converts potential energy into kinetic, and facilitates the outward evidences of that energy. The para-sympathetic or extended vagus is anabolic; it directs energy inwards and stores it up, as it were. The sympathetic or katabolic side of this system is closely connected with the adrenals, the thyroid, and the pituitary. The anabolic is equally closely connected with the digestive glands, such as the pancreas and the liver and their congeners. It thus becomes evident that the endocrines are not only, as we have already seen, our defenders against toxins, both endogenous and exogenous, but they are in addition important regulators of metabolism. In this scheme of things the central nervous system plays an important part. It is in a sense the captain of the ship. It is, nevertheless, itself dependent upon a proper endocrine balance.

The function of each gland in the endocrine system is to secrete a hormone which it discharges into the circulation, in order that it may influence the activities not only of some other gland in the endocrine system, but also many other structures of which the cerebral cortex is certainly the chief. It comes, then, to this; that the endocrine pattern determines the exact composition of the blood plasma, and inasmuch as the activity, efficiency, and indeed integrity, of all the tissues in the body are to a large extent dependent upon the suitable

composition of the circulating fluid, it is evident that the importance of the glandular tribute to the plasma cannot be over-estimated. I shall return to the question of the endocrine influence on metabolism at a later stage. I would here merely call attention to the fact that anabolism giving rise to obesity may result from a difficulty in any one of four glands : namely, the thyroid, the pituitary, the thymus, and the gonads.

Perhaps the most interesting member from a biological point of view of this endocrine hierarchy is the **Adrenal**. It links together the purely animal vegetative nervous system and the higher nervous system represented by the brain and cord, and it does this entirely by way of the endocrine glands. The vegetative nervous system, as is now well known, presides over the primitive interests of our animal life ; it is concerned with digestion, assimilation, excretion, and reproduction, and these functions it directs without reference to the central nervous system. Its action is automatic ; it is only when any of the organs in this system are in trouble that, in the form of pain or other discomfort, an S.O.S. message is dispatched to the central nervous system. There is another curious and hitherto unexplained association between the adrenal and the central nervous system. If during uterine life the cortex of the adrenal body does not develop properly, the brain fails to develop and an anencephalic monster is the result. This phenomenon occurs in man alone : never in the lower animals. The adrenal would therefore seem to be not only an *officier de liaison* between the sympathetic nervous system and the central, but to hold the key to the existence or continuance of life itself.

The adrenal has two other important functions to which brief reference must be made. The first is its power to raise the blood pressure. It is supposed that its real task is to hold the middle or muscular coats of the arteries in a state of tonus, and it is thus to some extent associated with the pituitary; the latter, however, would seem to be but a second string to the bow of this all-important function. Now, if the adrenals are irritated over a long period of time, the tendency will be for them to react by causing an undue contraction of the middle coats of the arteries, and the end-result of this process is seen in high blood pressure and arterial sclerosis. It would at this point take us too far afield to discuss the effect of local arterial sclerosis, but it is permissible to point to the fact that this process is more likely to occur in the arteries of the kidney itself than in those at a distance. The irritated suprarenal is therefore to be looked upon as the determining cause of chronic interstitial nephritis.

The other function of the adrenal is the response of the primitive emotion of fear. It is the organ of fright, fight, and flight. When this is brought under the control of the higher brain centres, it takes its proper place in the moulding of man as a social individual. When it is given free rein, as under the influence of noise and danger, the *genus homo* reverts to his most primitive type. Adrenalin is poured out into the circulation, and the muscles are tuned up for flight or fight, as the case may be. This is effected by raising the sugar content of the blood, in preparation, as it were, for the extra call for sugar by the muscles which will surely result from either flight or fight. In these days fear does not express itself either by fight or

flight; it expresses itself in worry or anxiety. In these circumstances the muscles are not put into violent action, so that the sugar is not utilised—it remains in the blood, in excess, and is then liable to appear in the urine. It follows that the physiological method of dealing with fear of any sort, whether mental or physical, is to take vigorous muscular exercise. The blood sugar, mobilised for flight or fight, is then utilised. It is worked off, as the saying is. "Emotion moves us," says Sherrington, "hence the name." But if it fails to express itself in physical movement, glycosuria is liable to occur. As Crile puts it, "When stocks go down in New York, diabetes goes up." (2) The people who under the influence of emotion indulge in inartistic gesticulations are thus seen to be acting physiologically; their blood sugar is used and their urinary organs are spared from offence. It is not in accordance with the practice of Anglo-Saxons to gesticulate or otherwise to "work off" their emotionally mobilised blood sugar, and the result is to be seen in their greater tendency to more profound and more prolonged response to serious worry and anxiety. Their very pleasures they take sadly. The same thing applies to the middle-aged in this country. Obesity and arthritis combine to prevent them from exercising their muscles, and inasmuch as they despise gesticulation, worry and anxiety affect them by disturbing their metabolism—to their ultimate undoing. Freedom from serious care is one of the essentials to longevity. If this cannot be obtained, then its physiological antidote, vigorous muscular exercise, should be sedulously cultivated.

In the foregoing I have made no distinction between the functions of the cortex and medulla.

It is, however, well that we should recognise that these two portions of the organ are in a sense perfectly distinct. It is, indeed, a curious thing that nearly all the endocrine glands, so far as we know at present, are not only endowed with a dual function, but that the two functions should to some extent, at any rate, be antagonistic. In addition to the suprarenal, this is true of the thyroid, the pituitary, and the gonad.

The function of the **Thyroid** is too well known to need any elaboration here, but it is only recently that the distinction between the thyroid and the parathyroids has been sufficiently worked out to enable us to see that the functions of the parathyroids are by no means identical with those of the larger gland. It is due to the work of Vines (3) that we have learned the profound influence of the parathyroids upon calcium metabolism, and the fortunate results which may be obtained by the exhibition of an extract of these glandlets in varicose ulcers, peptic ulcers, chilblains, and convulsive disorders, together with some other conditions, such as sprue, where a defective calcium metabolism may be suspected. Like the extract of any other gland in the system, parathyroid extract may do, and in my hands frequently has done, a great deal to relieve the unpleasant subjective sensations which so often afflict women at the menopause. When exhibiting parathyroid, it is well to give heed to Vines' warning that the extract is liable to find out a quiescent toxic focus which it causes to fulminate. This unpleasant experience has never occurred to me, but it occurred to a case within my knowledge, in which an acute antrum was provoked. It is, I think, unquestionable that a great many of the merits which used formerly

to be attributed to thyroid extract as a curative agent were due in a measure to the parathyroid constituent in these extracts. It is certainly the case that since pharmacologists have learned to separate the two elements in what is now called the thyroid apparatus, the commercial thyroid extract is far less active than it used formerly to be. When I am now disappointed with the result of thyroid therapy where I confidently expected to succeed, I am in the habit of associating with the thyroid extract an extract of parathyroid, in most cases with satisfactory results.

The effect of too little thyroid in the system, as Dr. Hertoghe, of Antwerp, long ago pointed out, is to give rise to the infiltration of the tissues by mucin, and if we bear in mind that this infiltration may occur anywhere in the body, it is easy to realise that a thyroid insufficiency, even when slight, may be responsible for a great variety of symptoms. One of the results of the deposit of mucin is to cause pain. The mucin finds its way into the white fibrous tissue, and fibrositis ensues. In the presence of myalgia, neuralgia, and other vague pains, it is always well to look for accompanying signs of thyroid deficiency, more especially when ordinary remedies have failed to give relief. I have more than once succeeded in relieving severe suffering of long standing by giving heed to this suspicion and acting upon it. The pain of this nature, which is most typically subthyroidic in origin, is backache. It is generally referred to the sacrum, and is liable to be very intense. It is often worse at night, and frequently forces the sufferer from his bed towards 5 a.m. Nervous patients are convinced that it is caused by "creeping paralysis."

Of all occurrences which drive a patient to the

doctor, hæmorrhage, from what surface soever, and however slight in degree, is surely the most unfailing. Pain, with the aid of aspirin, he will bear; his cold will be treated by the children's nurse; for diarrhœa he will apply to his maiden aunt; but blood is a serious matter. The causes of hæmorrhage from mucous surfaces are not in reality very many. Some are of evil omen; others are not. In illustration of the former may be cited the hæmorrhage which first brings to light a chronic nephritis, an arterio-sclerosis or any other serious condition associated with continued high blood pressure. In connection with the latter, epistaxis for example, every one has met with cases which seem to have no obvious significance, and which are quite justifiably dismissed as trivial. Now, hæmorrhage is a very frequent accompaniment of definite myxœdema, and is by no means infrequent in lesser degrees of thyroid insufficiency.

This fact was first brought vividly before me when an oculist sent me a lady who had had a fairly extensive hæmorrhage into one retina. The oculist could find no reason for this, and in his note to me suggested the possibility of renal disease. The appearance of the patient, as indeed is often the case, was such as to give considerable colour to the suggestion. But her blood pressure (about 110 mm. Hg) was low for her age, which was 55 years; the urine, which was high-coloured, with a sp. gr. of 1025, was free from albumin and sugar. Having satisfied myself on these points, I pursued the investigation further, and was not long in discovering very definite evidences of pronounced hypothyroidism. Since that time I have had similar experiences with hæmorrhages other than retinal, and when inquiring for signs of thyroid

deficiency I now make a point of asking if anything of the kind has ever occurred.

Dr. Hertoghe, whose contributions to the literature of hypothyroidism are amongst the most painstaking, interesting, and illuminating in any language, insists that menorrhagia is one of the most constant symptoms of hypothyroidism. "*En règle générale, l'insuffisance thyroidienne se traduit par des metrorrhagies, parfois effrayantes. L'administration de la thyroidine modère les pertes. Si l'on force les doses on peut même faire disparaître le phénomène menstruel.*" That is highly instructive; and coming from such a source, it must carry considerable weight.[1] It is also easy to remember. What is not so easy to remember is that thyroid inadequacy may be responsible for all kinds of obscure and seemingly sinister hæmorrhages, and unless the fact be recalled, their treatment will not be very successful.

But if hæmorrhage is the bogy of the laity, how shall we describe the effect which the discovery of albuminuria produces upon the physician? In its dreaded presence the most optimistic hastily sheds his optimism and gravely assumes the prognostic black cap. Youths have been coddled into hypochondriasis, sound lives have been declined insurance, healthy adults have been condemned to œdematous death, for no better reason than the discovery that a normal constituent of the liquor sanguinis occasionally appears in the urine. This matter is fully dealt with elsewhere; all that I

[1] And yet so competent an authority as Dr. Blair Bell, of Liverpool, says: "Thyroid insufficiency always causes a decrease in, or the complete cessation, of the function of menstruation, according to the degree of insufficiency." Such is certainly not my experience.

need say here is that to take fright at the presence of albumin in the urine is to trouble the waters without bringing the gift of healing.

The bearing of this upon the question which now concerns us is that albuminuria is not only the rule in myxœdema, but is very frequent in minor degrees of thyroid insufficiency, and an interesting point in this connection is that the albuminuria in such cases is largely orthostatic. The morning specimen may contain little or none, whereas the afternoon specimen may present large quantities.

One day I found in my wards a young unmarried woman of 30 who, so my house physician informed me, had been sent in two days before because she had a large quantity of albumin in her urine. A glance at the patient immediately told me that she was the subject of a fairly pronounced thyroid insufficiency. I pointed this out to the house physician, and confirmed the diagnosis by eliciting some answers as to the characteristic subjective phenomena. I then asked that I might be shown the amount of albumin. To the resident's intense astonishment there was no reaction either to boiling or nitric acid. Three days before, the reaction had been very pronounced. The moral of this is twofold. Not only is albumin very commonly present in the urine of those suffering from thyroid insufficiency, but when due to this cause the albuminuria is not infrequently of the postural or orthostatic type.

The adolescent albuminuria of this same type is almost invariably associated with thyroid insufficiency. The secretion of the thyroid apparatus is necessary to the proper utilisation of the calcium salts, and it is the relative absence of the calcium salts from the blood which gives rise to

this intrinsically harmless but erstwhile alarming phenomenon.

In no enumeration of the causes of dyspnœa which I can recall have I ever seen myxœdema mentioned. And yet, not only in confirmed myxœdema, but in degrees of thyroid inadequacy which fall short of complete efflorescence, dyspnœa is often a prominent and sometimes an alarming symptom. I have already said that mucin may be deposited in the internal organs without any very obtrusive signs appearing on the surface. This seems to be particularly true of the air-passages. Dyspnœa on slight exertion is often and quite properly cited as a sign of high blood pressure. It is even more often a sign of thyroid inadequacy. Whether it be that the deposit of tissue obstructs the passages, or whether the need for increased oxidation provokes the breathlessness, it is difficult to say. The former is the more probable explanation of the asthmatic or pseudo-asthmatic attacks which so often afflict the subthyroidic. Or, it may be that, in common with the tonsils and the adenoid tissue of the lymphatics, the bronchial glands enlarge and assist in provoking these attacks. Certain it is, at any rate, that the subjects of hypothyroidism are almost invariably troubled by dyspnœa on slight exertion, that they not infrequently have asthmatic attacks, even at an early age, and that in later life their sleeping respiration closely resembles that which is known as Cheyne-Stokes. In former years I have frequently sat, wondering why they did not die, at the bedside of patients who displayed the ominous rise and fall of the respiratory rhythm, which I had been taught to regard as the inexorable precursor of death. I wonder no longer. I

now know that it was not the true brand, and that these invalids were subthyroidic.

If one wishes to be amused as well as instructed, it is worth while to spend an hour in listening to an intelligent patient who has been cured of myxœdema, while he recounts the story of his mental states during his illness. The feature upon which he will lay most stress will probably be the insistent and overpowering somnolence which overcame him at most unexpected and inconvenient moments. He will tell you that his memory played him the most extraordinary tricks, and that such was the difficulty of anything approaching sustained attention that he was obliged to renounce all attempts to make a simple calculation, or even to follow the sense of a short paragraph in a newspaper. He will tell you of the most grotesque hallucinations, both visual and auditory, which would seriously have alarmed him had it not been for his serene and incurable apathy. In pronounced degrees of thyroid inadequacy these things are all liable to occur, but also in lesser degrees. Somnolence is so frequent as to amount to a rule. And it is not always ordinary sleepiness only; it may be sudden, surprising, and short-lived. I have frequently seen patients of this kind who have come to me wearing a tentative label of *petit mal* affixed by a painstaking but puzzled practitioner. And the mistake is pardonable enough. A sudden loss of consciousness, lasting but a few seconds, which is quite obvious to the onlooker, but of which the patient is totally unaware, is highly suspicious; and unless one remembers that such attacks are by no means uncommon in thyroid inadequacy, one is very liable to cause serious and unnecessary alarm. It

is the same with the memory. This is a symptom for which it is necessary to inquire. Patients are chary of talking about it, but once they are embarked, they will tell you the most surprising things. Here is an instance. A stockbroker of 50 years of age came to me complaining of what his doctor called neurasthenia. He weighed 16 stone, his pulse was 48 per minute, and his temperature 95° F. Without being exactly fat, he was lumpy; bulging in unsuitable places. His chief complaint was fatigue, physical and mental. When asked about his memory he seemed much relieved to be able to unburden himself on a subject which, although causing him great anxiety, he had never yet dared to mention to any one. He had made such ridiculous mistakes in replying to questions in connection with his business, the correct answers to which he knew perfectly well, that he was now obliged to have a clerk in his room to protect him, and he never ventured to give a quotation off-hand on " 'Change." His friends thought he had become eccentric. Thyroid extract soon deprived him of that reputation.

Bearing this in mind, it is surprising to find that some people who are physically very decidedly subthyroidic, succeed in keeping their mental faculties remarkably well sand-papered. I have known two professional men, one a barrister and the other a doctor, who carried on their respective callings with remarkable acumen and conspicuous success, while enormous deposits of mucin were rendering them grotesque in their outward seeming. It is in the presence of such cases as these that one becomes most impressed with the apparent caprice in the site selected for the mucoid deposit upon which I have already laid stress. Some-

times the encephalon may escape, but when it is involved, depression of spirits, noises in the ears, deafness, and visual phenomena are only some of the symptoms which may be expected. Night terrors, even in the middle aged, are not infrequent. Hertoghe reports one case in which complete atrophy of both optic nerves occurred.

The **Pituitary,** as is well known, consists of two parts, the anterior lobe and the posterior lobe, the functions of which are definitely dissimilar, so dissimilar indeed that the two might be regarded as distinct organs. As in the case of the adrenals and the thyroid, however, from the fact of these two portions being associated under one roof, we have to recognise that their association has been arranged or developed with some definite and practical physiological end in view. It may be that the two parts are thus placed together because their respective hormones when conjoined are more active in some important directions than if they were dissociated and reached the circulation at a considerable distance from one another; also that when thus conjoined they produce effects which could not be expected from either of them acting alone. It may possibly be that there is some action in play which is analogous to catalysis.

The anterior part of the hypophysis cerebri is glandular, and is very richly supplied with blood vessels; the posterior part is almost entirely nervous, and is very meagrely supplied with blood vessels. Contrary to what one would thus expect, the hormone of the posterior nervous part has been successfully isolated, whereas the hormone of the anterior part is still in the nature of a mystery. The activities which have been credited to the anterior lobe alone are probably due to the action

of the whole gland, but the essence of the posterior lobe has been proved, especially in gynæcology, to be very active when given subcutaneously.

A general pituitary insufficiency gives rise to symptoms which are not at all unlike those of myxœdema. As in myxœdema, the temperature of the body is low and there are very decided subjective feelings of frilosity, together with a degree of somnolence quite as pronounced as that which is found in myxœdema. The degree of this somnolence moved Cushing to suggest that the phenomenon of hibernation in animals may be determined by a physiological rhythmical, almost tidal, recession of the pituitary hormone.

It is now generally admitted that hypertrophic changes in the pituitary occur during pregnancy. Apart, however, from such definite anatomical changes as can be shown by skiagrams, it is evident that functional alterations may take place in the pituitary which are in every way comparable to those which affect the thyroid. Fleeting bi-temporal hemiopia during the last weeks of the multiparous gravid state have several times been described; so also have cases of hypertrophy of the turbinates. The subtle changes which appear in the faces of women during pregnancy are often accentuated to the point of producing enlargement of the lips and nose, with definite thickening of the tissues of the hands and feet, suggestive of transient acromegalic changes. "Pointing in the same direction," says Cushing, "are the not infrequent glycosurias of pregnancy, and I am under the impression that a notable increase in stature has been described as occurring occasionally in young pregnant women." There is no doubt that in this country, at any rate, the pelvis enlarges during

pregnancy, and as this is a bony change, the responsibility for it may surely be laid at the door of the pituitary.

Failure on the part of the anterior portion of the hypophysis causes the condition known as Froehlich's syndrome, which consists, as is well known, in a failure of normal growth, in obesity of a particular type, combined with an arrested development of the secondary sexual characteristics and sexuality generally. The obesity which accompanies pituitary insufficiency is described later, but here I may say that its usual distribution is from the girdle downwards. The ankles are by no means always involved, however; they may indeed be particularly fine and clean. Although the skeletal growth is stunted, sometimes in such a degree as to merit the term dwarfism, the intelligence may remain not only unimpaired, but apparently sharpened.

When, in the male, pituitary insufficiency arises after skeletal growth is complete, there is liable to be a change from maleness to femaleness so far as the external characteristics are concerned. The external genitals tend to atrophy, the pubic hair assumes a feminine distribution, and fat is developed in the breasts and other feminine localities. Pituitary whole gland, if administered early enough, will usually bring about a restoration to normal.

In pituitary insufficiency, from whatever cause arising, there are three diagnostic points which, although they have been described by Cushing,[4] seem to have attracted very little attention in this country. They consist in the absence of half-moons on the nails, the development of little black moles dotted about the skin, and an in-

adequate size of the outside upper incisor teeth. The function of the pituitary in connection with the development of dermic pigmentation is not at all well understood, but that there is such a connection seems very probable from the facts which have recently emerged from the study of heliotherapy.

Minor degrees of pituitary insufficiency have not been worked out to the same extent as the minor degrees of thyroid insufficiency—if indeed they exist. Those which are recognisable are usually connected with a failure on the part of one or more associated glands, particularly the gonads. Here is a case in point. A young lady of attractive appearance was brought to me by her mother, in the month of May 1911. She was 21 years of age. She began menstruating at the age of $13\frac{1}{2}$ and continued to do so painlessly, though not quite regularly, up to the age of $15\frac{1}{2}$. The menses then stopped suddenly, and had never reappeared. The cessation was at first regarded with equanimity by the parents. Gradually, however, they became aware that this physical fact was accompanied by a change in character. The girl's personal beauty had been considerable; she had been bright and coquettish, attractive to young men, and enjoying their society. All this was now changed. Her expression lost its fire and her manner its vivacity. The young men became indifferent to her, and she to them. Her parents became uneasy, and the doctor was called in. Then ensued a perfect orgy of treatment, medicinal, surgical, and suggestional, into the details of which it would be painful to enter. Suffice it to say that she suffered rest cures, curettages, aloetic purgatives, glycerine tampons, *et id genus omne* without any result physically, but

this result mentally, that she took fright at the very name of doctor. When she was dragged, apathetically protesting, into my astonished presence, she had not seen one for years. For reasons which it is not necessary to specify, I came to the conclusion that she was the subject of hypopituitarism, and prescribed the extract of the desiccated whole gland in doses of 10 grains three times daily. This was on May 9th. On August 4th the menses reappeared, normal in every way. She continued the extract, and with it, regular menstruation, until the following June. She was then so well, and had so completely recovered her former alertness and vivacity, that her mother regarded her as cured, and suspended the treatment. In August she missed her period; in September she did the same. In October I saw her again, and urged that the pituitary should be recommenced and persevered with. The result was again quite satisfactory, and had continued so when I last heard of her.

Over-action on the part of the pituitary, hyperpituitarism, during the growing period gives rise to giantism. Real giants invariably die of tuberculosis, but what may be called sub-giants—men, that is, of 6 feet 3 inches and over—though they may not die of tuberculosis, usually display certain signs of degeneracy, in that their powers of resistance to toxic invasion generally would seem to be definitely reduced. Such a man as a rule has a fairly good intelligence and may have considerable artistic taste, but he seldom has any real brain-power, and though of a gentle and kindly disposition, is inclined to be weak. The train of events would seem to be that the pituitary, exhausted in its energies by the creation of the giant

frame, is capable of very limited activity for the rest of the life of the individual, unless it can be supported by therapeutic means. In spite, however, of the exhaustion of the pituitary, these people seldom become obese. They may do so, but whether they do so or not, they usually benefit very materially from the exhibition of pituitary by the mouth.

It is well known that thyroid deficiency is often accompanied by the swelling of the gland; the same thing would seem to happen in the case of the pituitary, because most cases of a deficiently acting hypophysis are accompanied by headache. The headache is usually very severe on account of the fact that the organ is, as it were, concealed in a little skull of its own which has an exceedingly unyielding envelope. It is said that certain kinds of epilepsy are due to pituitary insufficiency, but the evidence on this point is conflicting. There can be no doubt that neurotic diseases, such as neurasthenia and myasthenia, are often very much aggravated, if indeed they be not definitely caused, by a failure of activity on the part of this gland.

When, for any reason, the pituitary becomes over-active after the growth of the long bones is complete, the condition produced is known as acromegaly. The cause in the majority of cases is tumour formation, which is not infrequently of a gummatous nature. All the symptoms of an intracranial tumour will be found on careful examination. The externals of the disease are quite unmistakable to anybody who has ever seen a case. Unfortunately, no therapeutic measure has ever been found to do any good.

Not infrequently we find signs of mild pituitary

insufficiency superimposed on those of relative pituitary excess. There are a fair number of people going about who are so much taller than the normal as to give rise to a suggestion of giantism, men of over 6 feet 3 inches, and women of 5 feet 10 inches. To careful examination a certain number of these people will reveal present evidences not of pituitary excess, but of pituitary insufficiency. They have grown rapidly, outgrown their strength, as the saying is, in response to an irritated pituitary. At a given moment the relative pituitary hyperactivity dies down, to be followed by the relative insufficiency of exhaustion, and, although the balance may ultimately become redressed in some degree, that person's pituitary gland is always lacking in vigour, and without outside help will generally give rise to unpleasant symptoms. The preliminary excess is to be seen in the abnormal height, the spaced incisor teeth, the large hands, and the misshapen lower jaw, which is either receding or underhung, according to the age at which the pituitary excess began to die down. The existing insufficiency is evidenced by intolerance of extremes of temperature, by late oncoming, irregular, and painful menstruation, by the absence of half-moons on the nails and other irregularities of pigmentation just mentioned, especially little black moles, " beauty spots," dotted about the body. These people are as a rule mildly but definitely undersexed, and tend to become obese on and below the waist-line. But it is not any of these things which brings them for advice. They come under our notice for indefinable departures from health—headaches, asthenia, lethargy, and the various symptoms which are classified as neurasthenia. They are

fortunate if they escape the stuffing of the Strasbourg goose type and the spanking of the anecdotal and too-familiar masseuse. In any case they will obtain no real relief until some one recognises in them the stigmata of their pituitary debauch.

The dose of pituitary whole gland extract, as usually quoted, is insufficient to produce any real effects. I have found 10 grains three times a day of the desiccated extract to be a very moderate one, and I have increased this dose to three times that amount in a great many cases without ever producing any unpleasant symptoms. Indeed, I know of no toxic effects to be expected from the oral administration of the whole gland. Another point to be remembered in connection with the administration of pituitary extract by the mouth is that it takes a long time to act. Unlike the thyroid, which produces its effects often in a surprisingly short space of time, the effects of pituitary show themselves in a very deliberate manner. If, therefore, a diagnosis of pituitary insufficiency is established, it is necessary to warn people that the good effects of the treatment must not be expected immediately. These good effects I have always found to be very much enhanced by a meatless and sugarless dietary. This is true of all treatment directed to the rectification of the endocrine imbalance, but it seems to be more conspicuously the case with the pituitary than with any other gland.

In this connection the following quotation is pertinent ([5]) :

" Almost all pronounced, outspoken incretory disorders develop slowly, with the single occasional exception of a sudden fulminating attack of Graves's disease following shock. It should not

be expected that specific gland administration will correct these abnormalities overnight. The unfortunately too common practice of prescribing a two weeks' supply of gland tablets or capsules, and expecting positive achievements within such a very brief period, is quite absurd. It is beside the point that the adrenal, ovarian, pituitary, and testicular products at present available are far from perfect in standardization or potency. Nothing can be expected from their haphazard administration, usually in inadequate dosage over a few weeks' time. Not even thyroid extract will prove efficacious under such conditions."

The posterior lobe of the pituitary secretes an active principle which is obtainable in ampoules for use by subcutaneous injection. This substance is used as a galactagogue. It is also used in surgical shock and collapse. It is of considerable value in what the French call "asystole"—that is, a failing cardiac musculature. It is reputed to have a good effect upon unstriped muscle generally, but has no effect upon normal intestine. It has a very decided influence in promoting contractions in a post-partum uterus, but it has no power over the unimpregnated organ.

Blair Bell ([6]) has used it with success in cases of sepsis of a serious character, such as may occur with appendicitis or puerperal fever. It has, like adrenalin, been used in spasmodic asthma. Its use is also advocated in cases of recurrent herpes zoster. When the blood pressure is really high, injections of pituitary should be given with caution. It should also be given with considerable care to anybody who has at any time suffered from glycosuria.

Here let me say that the action of some of the hormonic extracts is occasionally increased by

some alien substances under circumstances which have, so far, escaped explanation. It is, for instance, very difficult to understand how morphine can increase the effect of thyroid extract, the two apparently having diametrically opposite actions. It is easier to understand how it is that the vitamins present in butter should increase the effect of thyroid extract. They do : but how the result is achieved no one knows. Then, again, action of the posterior pituitary is known to be enhanced by the presence of cocaine. It is probable that some of these effects are in reality instances of catalytic action, and that more will be heard of this matter in the near future. For the present, however, we must be content to regard the component parts of the various glands as in some very definite way related to one another, the two portions of the adrenal ; the two portions of the thyroid apparatus ; and the anterior and posterior pituitary it is well to regard as acting together for certain purposes, even though we can differentiate between the action of their component parts.

The pituitary body is responsible for most cases of diabetes insipidus. I say most cases, because a very fair proportion have been shown to be due to a syphilitic meningitis at the base of the brain, so that, before attributing the cause of this troublesome disease to some defect on the part of the pituitary, the patient should be subjected to a blood test for the purpose of determining the absence or presence of the spirochæte. The nature of the pituitary lesion, when present, is generally a gross one, usually a tumour. This, of course, may be suspected if any definite eye symptoms are present, more especially bitemporal hemianopsia. As this brings us into the region of cerebral tumours

generally, the matter is not one to be pursued here.

The katabolic members of the endocrine system—the adrenal, the thyroid, and the pituitary—are thus seen to be closely associated with the vegetative or sympathetic nervous system. The adrenals indeed are so closely associated with this system that they may in a sense be considered identical with it. As Langley ([7]) expresses it, the injection of adrenalin produces the same effect as stimulation of the sympathetic. The thyroid, as McCarrison ([8]) has said, is to the human body what draught is to the fire: it aids in all the katabolic activities of the sympathetic. This interesting and instructive writer points out and emphasises the great demand which is made upon thyroid secretion by infections and intoxications, and how it may thereby be exhausted. Crile has shown us the enormous influence of the emotions in stimulating the thyroid. The pituitary, by screening, as it were, the action of the adrenal in certain directions and supporting the thyroid in others, is a very active kataboliser; its chief function in this direction is probably that of controlling the excretion of the urine.

Of anabolic glands common to both sexes the **Pancreas** is the most important, but in woman the ovary is more definitely anabolic. The pancreas, as is well known, is endowed with an external secretion and an internal. The external is chiefly engaged in preparing the food-stuffs, whether they be proteins, carbohydrates, or fats, for digestion and ultimate absorption. The internal has been proved by Banting to be concerned with the utilisation of sugar by the tissues. This internal secretion resides in the islets of Langerhans, and it is by

employing extracts from these islets that Banting has succeeded in controlling the amount of sugar in the blood.

A certain proportion of sugar in the circulating fluid and tissues is necessary to the continuance of life; but an excess of sugar gives rise to the symptoms which we recognise under the term glycosuria. Banting's product, insulin, succeeds in reducing the amount of the blood sugar very rapidly. Having regard, therefore, to the power of insulin in this direction, it is necessary to exercise very special care in its exhibition, for if given in excessive doses it may easily reduce the blood sugar below the safety level, and thus give rise to very serious symptoms. It has been suggested that the hormone which we now know under the name of insulin is secreted by glands other than the pancreas, but there is at present no proof that such is the case. An interesting point about Banting's work is that he has incidentally discovered a new form of glucose, which he has called gamma-glucose, and it is in this form of gamma-glucose alone that sugar seems to be utilisable by the economy. When there is not sufficient insulin to convert into gamma-glucose, some of the sugar in the blood remains in a non-assimilable form, and sooner or later finds its way into the urine. Incidentally it is of interest to note that pituitary extract can completely antagonise the action of insulin, a fact which has been cited in support of the view that even true diabetes may be caused by disturbances other than a lesion in the pancreas.

The position of the **Gonads** in the endocrine hierarchy is exceedingly difficult to determine. As might be expected, they differ in their effects in the two sexes. The ovarian hormone determines

the secondary female characteristics; the testicular, the secondary male characteristics. The former is therefore very definitely anabolic, and the latter katabolic. The relations which subsist between these glands in both sexes with other glands in the endocrine system seem to be as intimate as they are elusive. Thus, the pituitary and the adrenal have very close connections with the testicular hormone, while the thyroid's connections are chiefly with the ovarian. It is nevertheless the case that the ovarian activity is very profoundly influenced by the pituitary, and not only the ovarian, but probably the whole female reproductive apparatus, including the mammæ. The influence of the posterior pituitary extract in causing contractions of the uterus is nowadays largely utilised in gynæcological practice, and therefore needs no insistence.

The conception of the endocrine system as a system rather than as an association of glands, which it is requisite to bear in mind, is apt to be obscured by the supreme importance which each gland in its turn seems to possess. One is reminded of those detective stories in which the reader is led to believe that each character in turn is surely the real culprit. In the play of these glands, I am, as a rule, firmly convinced that the thyroid is the "star turn," but whenever I contemplate the potentialities of the adrenals, the pituitary, and more especially the gonads, this conviction weakens. The ancients who worshipped the phallus as the origin of life were animated by sound if savage instinct; for latter-day science has taught us that the secretion of the testis comes very near to fulfilling that claim. The researches of Voronoff in testicular grafting, which have been

confirmed by Kenneth Walker in this country and Max Thorek ([9]) in America, prove to my mind very conclusively that the internal secretion of the male gonad can accomplish miracles beside which those achieved by the thyroid extract in myxœdema fade into relative insignificance. These researches have taught us this clinically important fact, that though quite inert when administered orally, presumably through the destructive action of the gastric juices, the internal secretion of the male gonad is extremely potent when applied in the form of grafts. These grafts must, however, be applied scientifically to situations in the human body where experience has shown that they may be expected to survive. When they do survive, their beneficial effects are exercised by no means exclusively and even predominantly upon the sexual capacity, but are displayed to an even greater extent in the muscular, mental, and even arterial rejuvenescence of the patient. There is here no question of putting new wine into old bottles, because Voronoff's results strongly suggest that the bottles themselves—the blood vessels—partake in the general rejuvenescence, and he believes that the application of his methods as they become perfected, and when applied sufficiently early, will eventually result in prolonging the ordinary span of life to 100 or 120 years.

Until comparatively lately it was believed that the hormone of the male gonad was derived from the tubuli seminiferi, and perhaps to some extent from the prostate gland. This view held the field until about 1903, when Ancel and Bouin published the first of their series of papers claiming for the interstitial cells of the testis the responsibility for the testicular hormone. The views expressed

by these two observers were very generally accepted until quite recently, when, curiously enough, a good deal of evidence has been adduced to show that the hormone does, in fact, emanate not from the interstitial tissue, but from the tubuli seminiferi themselves. The operation of ligaturing the vas deferens on one side with the object of stimulating the interstitial cells has been performed on elderly men, and is said to have been followed by a remarkable access of mental and physical vigour. Steinach, of Vienna, was the pioneer of this operation, for which he claimed very remarkable results.

Those surgeons who have followed him, however, are by no means unanimous as to its advantage. Mendel, for example, declared that the effect in one case operated on by him was disastrous; mental disturbances followed the operation as well as sexual aberration, and the patient had to be committed to an asylum. Figtje also speaks badly of the effects of the operation. Benjamin and Wolbarst, on the other hand, report favourably of the results obtained in the patients operated on by them. Benjamin declares that about 40 per cent. of his cases were positively regenerated, both subjectively and objectively; and Wolbarst says that of seven cases of actual senility operated on, four showed material benefit which continued from six to seven months following the operation.

Dr. Johnston Abraham, in the Preface to the English translation of Dr. Peter Schmidt's ([10]) book, expresses a reasoned confidence not only in the effects of the operation but in the duration of the effects. He says that a marked physical and mental rejuvenation does follow in selected cases, and those have been known to last for five years.

A communication (11) from Hochenegg's service emphasises the transient nature of the admittedly good effects, but issues a grave warning as to the bad effects, in many cases, on the central nervous system.

The general opinion, so far as one is able to gather from the very contradictory views expressed in the literature at present available, seems to be that the Steinach operation succeeds in a fair number of selected cases, but that its effects are relatively transitory and may be expected to last for about twelve months at most. In a recent paper Dr. Carl R. Moore, to be cited presently, writes very definitely on this subject. He says :

" It will be understood that this operation, the so-called Steinach operation, is practised on the human individual for a supposed tuning-up of a worn-out organism. The significance of the testis reactions following vasectomy as described by Steinach can be weighed briefly in two considerations : First, in the many cases of vasectomy performed in our laboratory on guinea-pigs, rats, sheep, and rabbits, no single case has ever occurred where interstitial cell hypertrophy followed as a result of this operation ; and it should be remembered that this is the only morphological basis upon which Steinach's regeneration rests. Second, should an hypertrophy follow, it would remain to be proved that a mass of interstitial cells in the testis represents a corresponding quantitative intensity in the production of internal secretions."

The operation of testicular grafting is associated with the name of Dr. Voronoff, of Paris. By a series of experiments on animals, this observer showed that senescence can be delayed and senility rejuvenated by grafting young testicles into old animals. He also showed that a male animal

castrated before maturity, which consequently failed to develop the secondary male characteristics, could be made to develop these characteristics by testicular grafting. Moreover, it became evident that such animals rapidly acquired the power of copulation, though not, of course, of reproduction. Into one normal young male goat he grafted an additional testicle, a third, with surprising results. The animal's horns grew to twice the length of the normal; so did its hair, especially its beard. It rapidly gave evidence of being grossly oversexed, and became so combative and *méchant* that it had to be killed. The head and skin have been preserved, to convince the incredulous.

Having thus satisfied himself by over 150 experiments of the potency of the gonadal hormone in rejuvenating old animals, masculating neuters, and over-masculating normal males, Voronoff decided to turn his attention to human beings in order to see whether in them the hormone acted in the same way as it did in the lower animals. There are two preliminary points in connection with this side of Voronoff's work which may suitably be emphasised here. The one is that the only animals possessing a gonad which is capable of being grafted into human beings with any prospect of survival are the anthropoid apes, preferably the chimpanzee. Chimpanzees are expensive; they cost from £100 to £150. Voronoff's operation is therefore expensive.

The second point is that, in his operations on the human invalid, Voronoff's aim has never been that of restoring the mere sexual capacity. His object has been the rejuvenescence of the mental and muscular vigour, and the case to which he

points with the greatest satisfaction is that of a man, an author, prematurely senile, to whom he has restored all his powers save only on the *côté génésique*. As at present performed by Voronoff himself and by some surgeons who have been intimately associated with him in his work, I believe the operation of testicular grafting to be capable of conferring enormous benefits upon those to whom it is applicable, and well worth a trial in cases which present no evidence of counter-indicating disease.

Some very excellent work on this subject has been done by Kenneth Walker in this country. Three papers published in *The Lancet*,[12] collected in pamphlet form, should be carefully studied by any one interested in this matter.

This is not the place to enter into any details of the results of Voronoff's operation or its technique,[13] but it is desirable to point out that those investigators who claim to have followed his methods without having been able to confirm his results must be considered to owe their failures to an insufficient appreciation of the principles which Voronoff has evolved. One of these is the site of the graft. Some surgeons, in imitation of Voronoff's earlier work, have applied the grafts to situations, such as the peritoneum, in which experience has shown them to be incapable of surviving. Others have not been careful to ascertain that the donor ape had arrived at sexual maturity. Others, again, instead of using grafts from the gonads of apes, have taken them from the undescended testicles removed from human cryptorchids. Dr. Carl R. Moore, of Chicago, in a most valuable paper,[14] throws an abundance of light on both these points. He shows that a testis

which is concealed within the abdomen is degenerate; that a normally descended testis when artificially replaced within the abdomen, at once proceeds to degenerate; and that a degenerate testis when rescued from the abdomen and placed in the scrotum, is gradually restored to normal. To account for these striking and interesting facts was not an easy matter, but the solution was ultimately discovered in the difference in temperature between the abdominal cavity and the scrotal. Briefly to recapitulate the conclusions arrived at: it seems to be established that the testis is unable to bear the ordinary temperature of the body, and that it is placed within the scrotum in order that the latter may act the part of a thermo-regulator. A side issue suggested by Dr. Moore's paper has a very practical bearing. It is as to whether the overclothing of the scrotal area, which is habitual with elderly men, may not be a powerful contributory factor in determining the premature decline in sexual capacity. This explanation of the biological significance of the scrotum is not only of very considerable interest, but also of practical importance. In his book, Cunningham ([15]) says: "Various causes have been suggested for the formation of the scrotum, but no one has ever been able to suggest a use for it." The same might be said of the prepuce, and it is quite possible that Dr. Moore's discovery will furnish an explanation of the significance of this much-abused portion of the integument. The advantage of free ventilation of the scrotal area may be seen in the bodily and sexual vigour of those who wear kilts.

I have seen a great many of Voronoff's cases, the great majority indeed, both animals and men, and I have no hesitation in saying that in spite

of some failures which were probably due to some slight fault in technique, the operation succeeds in doing what it claims to do. It claims to restore mental, nervous, and muscular vigour in healthy senescent men. It does not claim to restore sexual capacity to the effete. Nevertheless, it frequently succeeds even in doing this.

Soon after the X-rays were introduced it was found that many very serious penalties attached to the pioneers in this fascinating means of diagnosis and treatment. Among the less serious drawbacks to constant exposure to these rays it was found that the operators became sterile. They did not lose their sexual capacity or their sexual appetite, but they became incapable of begetting children. In 1905 Bergonié and Triboudeau showed that the effect of the rays was to cause atrophy of the seminal tubules and concomitant hypertrophy of the interstitial glands—the same result, in fact, as is now known to be produced by ligature of the vas deferens. It therefore comes to this : an elderly man who wishes to renew his youth need not subject himself to the operation of ligature of one vas deferens so long as he can find a radiologist who can expose one testicle, and one only, to the activities of the X-rays for a period sufficiently long and in a dose sufficiently powerful to ensure the atrophy of the seminal tubules on that side. The interstitial glands will then hypertrophy and fructify, with results which may or may not be altogether desirable, even to the individual. On that point there is only Faust to interrogate, and he is silent.

There are some other influences of what may be called a more normal kind than the foregoing, which seem to give rise to results somewhat

analogous. Chief among these are the poisons of alcohol and tuberculosis. It is a common observation that alcoholic drinks produce an aphrodisiac effect upon some people. The porter in *Macbeth* informs us that " drink is a prevaricator with lechery ; it creates the desire and takes away the performance " ; the physiological meaning of which is that while stimulating the interstitial gland, it paralyses the sphincters of the veins in the corpora cavernosa.

That chronic alcoholism leads to a hypertrophy of the interstitial element in the human testicle is now a recognised fact ; that it leads to a concomitant inactivity of the seminal tubules is a reasonable deduction from many of the confidences, some of them embarrassing, which we receive in the consulting-room. In the matter of tubercle, it has long been recognised in France that a very early manifestation of the disease is a heightening of the sexual appetite. In this country the matter is, of course, regarded from the opposite point of view, namely, that the pulmonary phthisis, when it appears, is the just punishment of the premonitory sexual excess. Wherever the truth may lie, all the authorities who have written on the subject agree that after death from pulmonary tuberculosis the interstitial glands are found to be much hypertrophied.

The relationships between the various glands and the gonads are not easy to seize. Some facts concerning these relationships seem to be firmly established, whilst others require confirmation. First, then, there is the suprarenal, which appears to be a predominantly male gland. Its cortex seems to supply a combative element to the character, and, as I have already mentioned, when the whole gland

is well developed and active, the stature is medium or short, the trunk is hirsute, and the individual is normally and even abnormally sexually inclined. There is here some very obvious association between the gonad and the adrenal, but the exact nature of that association remains to be explained. Then there is the thyroid, a predominantly female gland, which is, nevertheless, not only the great stimulator of metabolism in general, but seems to exercise a particular effect upon the sex glands in the male, inasmuch as, when orally administered, the extract will often cause the descent of a hidden testicle in young adults. And, again, there is the pituitary, which presides over the type of the bony skeleton, and is therefore presumably under the direction of the appropriate gonad, male or female, as the case may be. And yet it seems to have a peculiarly intimate connection with the ovary, for, as I have already shown, ordinary amenorrhœa is more surely and more swiftly cured by oral exhibition of its extract than by all the curative and curettive ministrations of the operating gynæcologist. Nor need I insist that Froehlich's syndrome, as it is called, dystrophia adiposa genitalis — or, as Jonathan Hutchinson, who was the first to describe it, originally christened it, lipomatosis universalis asexualis—proclaims a direct and intimate relation between the pituitary and the male gonad, for the dystrophy is very amenable to the sustained exhibition of extract of the whole gland by the mouth. Then there are the glands, notably the thymus and the pineal, which, as we have already seen, act as a drag or check upon the activities of the gonads and its associated katabolic glands.

The main enemies of the endocrine glands are

toxins, whether these be endogenous or exogenous. If a time should ever be when we shall be able to allocate to each gland its responsibility for a particular toxin, that time is not yet, so that our only rational course is so to husband the resources of the endocrines by protecting them from unnecessary poisons as to keep them fresh and alert to deal with such as are inevitable in our present artificial communal life. If we fail thus to protect them they become prematurely exhausted by the ceaseless conflict with poisons which come from without. That is why a gradual decline in vitality so often begins at about 50 years of age, why cancer comes, and arterial sclerosis and other degenerative conditions. The endocrines thus gradually retreating before the advancing toxins, are at last driven to capitulate, and the end comes. By a wise substitution therapy much may be accomplished to restore the flagging forces, especially when combined with hygienic righteousness in food and exercise. In the matter of the gonads, I may reiterate my firm belief in Voronoff's operation and my scepticism as to the value of Steinach's.

It is an interesting fact that the glands in both sexes which show the first signs of fatigue are those which seem to have the closest connection with the gonads, namely, the suprarenal in man and the thyroid in woman. In woman the reproductive capacity is definitely brought to a close at the menopause, and it need not surprise us that the necessity for redressing the endocrine balance, consequent upon the withdrawal of the ovary from practical politics, should give rise to considerable constitutional disturbance. In our efforts to promote a restoration of the balance, the member of the hierarchy to which we may appeal with

most confidence is the thyroid apparatus. Thyroid extract is often of itself helpful; and parathyroid still more often, but a combination of the two will usually be found more useful than either alone.

And here let me say, what I have so often said before, namely, that the appeal to thyroid extract, for whatever purpose, should always be made cautiously at first—that is, with very small doses; never more than 1 grain per diem. I have been preaching this gospel for many years, and, although I am pleased to say I have made many converts, even now scarcely a week passes without my being profoundly shocked by the seemingly light-hearted manner in which members of the profession throw 5-grain tablets at their patients, as though they were dealing with confetti at a carnival.

That the combative gland, the suprarenal, shows declining vigour as the years advance, is a matter of common observation. Bacon tells us that "men of age object too much, consult too long, adventure too little, repent too soon, and seldom drive business home to the full period, but content themselves with a mediocrity of success," which is only another way of saying that the gland of fright and fight has lost its recoil.

It is often said that a train of phenomena takes place in men between 60 and 70 in many ways comparable with the menopause in women. I have never been able to support this view. It is undoubtedly true that in most men the copulative and reproductive capacity begins in that decade sensibly to decline, and ultimately to peter out. But by no means in all men. We could, all of us, cite outstanding instances of men who have retained a large measure of sexual power well into the following decade. There is obviously no reason

why a man should lose his copulative and reproductive power so long as his gonads retain their efficiency, and this efficiency usually becomes impaired about the sixties because of the accumulation of poisons in the system. In any case there is no sudden jump from competence into incompetence. We have already seen that certain poisons (and I have instanced two only among many) cause an atrophy of the seminal tubules and a hypertrophy of the interstitial glands. Now it is more than likely that the interstitial hypertrophy represents an endeavour on the part of these glands to repel a chronic toxæmia. The hypertrophy succeeds for a time in supplying the extra quantity of necessary antidote, but at last, overwhelmed by the strength of the invader, the gland succumbs. We see this train of events so often in the case of the thyroid—the goitrous cretin, for example—that it seems reasonable to offer the same explanation in the case of the male gonad. Then there is the senile hypertrophy of the closely associated prostate to account for. Is it possible to doubt that this, too, is an antitoxic gland, or that its gradual enlargement with advancing years is due to the constant endeavour to prevail in the unequal combat against lethal poisons introduced from without ? Sir Humphry Rolleston, in his admirable work,([16]) successfully burst the bubble of the so-called male climacteric. " It has from analogy of the female sex been rather fancifully suggested that in man there occurs about the age of 50 a critical period (*climacterium virile*) due to changes in the sex glands or prostate, but of this there is no proof." After discussing Sir Henry Holland's idea of a definite climacteric disease in man, he continues : " The conception of a climacteric dis-

ease is interesting historically only; and it may be agreed that, apart from accidents of environment, the progress of senescence in healthy men is gradual and uneventful."

Concerning the antiseptic or detoxicating power of the endocrines as a whole, and of the thyroid in particular, much has been said by many. The disturbing fact, nevertheless, remains that people with pronounced myxœdema are very seldom the subjects of acute toxic invasion. Whether, as has been suggested, the explanation is to be found in the greater detoxicating power of the thyroid's antagonists, or in some hitherto undetected factor, it is impossible to say. We have to admit that in the present state of our knowledge the fact is an awkward one for the theorist. That the thyroid hormone is designed to exercise some special effect upon the contents of the thoracic duct—presumably a detoxicating effect—is suggested by the fact that the thyroid veins join the internal jugular, the superior immediately above, and the inferior immediately below, the point at which the thoracic duct empties its contents into the heartward flowing blood. How it comes about that the complete absence of the hormone, such as occurs in pronounced myxœdema, should be accompanied by an apparent immunity from toxic invasion, is at present a mystery.

A study of the endocrine pattern of an individual is often very helpful in forming an estimate of his constitution, his powers of resistance, and his response to stimuli of various kinds. The endocrine pattern displays not only the general make-up of the somatic tissues, but it reveals the qualities, the defects, and the subtleties of the mind and character. In a fascinating book, full of facts and

suggestions, Louis Berman,([17]) of Columbia University, sustains the thesis that the domination of a particular gland, whether by plus or minus influence, is capable of acting as the very mainspring of a person's being. "Personality," he says, "embraces much more than merely the psychic attributes. It is not the least important of the lessons of endocrine analysis that there is no soul, and no body either. Rather a soul-body or a body-soul or the patterns of a living flame." He then proceeds in a more practical and material mood to point out the salient features in the personalities as dominated by some of the better-known glands:

"In an adrenal personality, the epidermis is always slightly, somewhat, or deeply pigmented. The pigmentation is due to a dark brown deposit lightly or thickly scattered over the skin. With the general diffuse pigmentation or darkening there are often the black spots, the pigmented birthmarks, or the lighter ones of freckles. The latter signify some permanent or transitory adrenal inadequacy in the past, ante-natal or post-natal, of the individual, and presage the same in his future. These spots have been frequently observed to appear after an attack of diphtheria or influenza. There seems to be more tuberculosis among those who have them than among those who do not. We therefore say that diphtheria, influenza, and tuberculosis stand out as adrenal-attacking diseases, which have a greater power to kill, cripple, or hurt those with defective adrenal constitutions than others."

"The hair of the adrenal type is characteristic: ubiquitous, thick, coarse, and dry. It is prominent over the chest, abdomen, and back, and has a tendency to kink. Often its colour is not the expected: an Italian's will be yellow, a Norwegian's

jet black. It has been stated that most red-haired persons are adrenal types. Such persons also have well-marked canine teeth, which is another adrenal trait. They also have a low hair-line."

" The masculine pituitary personality, the man with a dominant anterior pituitary gland in a roomy sella turcica with plenty of space to grow in, is the ideal virile type. They are generally tall (unless the growth of the long bones was checked too early by a social precocity of the testes), with a well-developed frame, large firm muscles, and proportionately sized hands and feet. The head is of the marked dolichocephalic type, flattened at the sides, face is oval more or less, with thick eyebrows, eyes rather prominent, nose broadish and long, lower jaw prominent and firm. Prominent bony points like the cheek-bones, the elbows, and the knees, the knuckle-joints of the hands and feet. The teeth are large, especially the upper middle incisors, and they are usually spaced. The arms and legs are hairy. High-grade brains, the ability to learn and the ability to control, self-mastery in the sense of domination of the lower instincts and the automatic reactions of the vegetative nervous system, the rule by the individual of himself and his environment, are at their maximum in him. The anti-pituitary personality is educable for intelligence, and even intellect, provided the proper educational stimulus is supplied. Men of brains, practical and theoretical, philosophers, thinkers, creators of new thoughts and new goods, belong to this group."

The Thyroid personality is characterised during maturity

" by a lean body, or tendency rapidly to become thin under stress. They have clean-cut features and thick hair, often wavy or curly, thick long eyebrows, large, frank, brilliant, keen eyes, regular and well-developed teeth and mouth.

Sexually they are well differentiated and susceptible. Noticeable emotivity, a rapidity of perception and volition, impulsiveness, and a tendency to explosive crises of expression are the distinctive psychic traits. A restless, inexhaustible energy makes them perpetual doers and workers, who get up early in the morning, flit about all day, retire late, and frequently suffer from insomnia, planning in bed what they are to do next day."

The Thymo-centric personality shows itself

" after puberty, when the thymus should shrink and pass out of the endocrine concert as a power, that the more complex reactions of personality emerge when the thymus persists and refuses to or cannot retire. The persistent thymus always then throws its shadow over the entire personality. To what extent that shadow spreads depends upon the strength of the other glands of internal secretion, their ability to compensate or to stay inhibited. Whether or not the pituitary will be able to enlarge in its bony cradle seems to be the most important factor determining these variations. If there is space for it to grow, at any rate normally, the individual may pass for normal, although he will have difficulties throughout life he may never understand, particularly in sexual directions. If the pituitary is limited partially or completely, the thymus predominance is more prominent and fixed, and the abnormalities become obvious, both of person and conduct.

" The anatomic architecture of the latter thymo-centric personality is fairly typical. The reversion in type of the reproductive organs, the slender waist, the gracefully formed body, the rounded limbs, the long chest, and the feminine pelvis strike one at the first glance. The texture of the skin is smooth as a baby's, and sometimes velvety to the touch. Its colour may be an opaque white, or faintly creamy, or there may be an effect of a

filmy sheen over a florid complexion. Little or no hair on the face contributes to the general feminine aspect in the more extreme types. They are often double-jointed somewhere, flat-footed, knock-kneed."

" Homosexuality, in one form or another, frank or concealed, haunts the thymo-centric and spoils his life. The persistent thymus, like a vindictive Electra, stalks the footsteps of its victim, its possessor. He wishes to live, according to society's remorselessly rigid expectations, for virility and happiness. But his thymus condition forces him also to live for femininity and misery. That homosexuality is not purely a psychic matter, of complexes and introversion, as the newest psychology would have us believe, has been proved by observations of its development in animals with internal secretion disturbances, acquired or experimental. Thus it has been recorded that a male dog showed a large goitrous swelling of the thyroid in the neck, with a rapid heart, staring eyes, the loss of flesh and fat, and the nervousness of a hyperthyroid condition. Therewith he became an absolute homosexual. Observations on the Primates along the same lines have been made. In goitrous hyperthyroids thymus persistence is common."

It may be argued that these generalities are somewhat fanciful, but it is to be remembered that the above passages have been torn from their contexts, and that the author claims no more for his theories than is justifiable in any pioneer who breaks fresh ground. Dr. Berman holds, and I am strongly inclined to agree with him, that the glandular imprimatur visible in the outward seeming of an individual has its counterpart—roughly but surely—in the force and direction of his mentality. This side of the endocrine question is admittedly in

its infancy, but it holds a promise of absorbing interest for the future. At present I do not think we can claim for the various types above indicated anything more than a tendency in the directions mentioned. The ultimate outcome in any individual case will always depend upon the nature of the environment and upbringing.

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CHAPTER IV

THE CLIMACTERIC

THE gonadal element in the endocrinology of the plateau differs so widely in the two sexes that to deal with the important and complicated feminine aspect, a separate section is necessary. To understand the disturbances which take place at the menopause and their methods of production, it is desirable to begin by glancing briefly at the vascular phenomena of normal menstruation.

At an ordinary menstrual period the uterus and its appendages pass through a phase of increased functional activity, which necessitates an increased blood supply to these organs. The tributary arteries accordingly dilate, and in obedience to a well-recognised law [1] there is a compensatory vaso-constriction in some of the other systemic arteries. Were it not for this compensatory vaso-constriction, the dilatation in the pelvic area would entail a considerable fall in the general blood pressure, a state of matters which the medulla, in its extreme jealousy of any restriction of supplies, will never permit. This, then, is what occurs: the pelvic vessels dilate; to compensate for which, there is a contraction in certain other vessels, which, as will appear later, are probably

[1] "It follows that every variation in one part is compensated by a simultaneous and contrary variation in another part" (Leonard Hill, in Schafer's *Experimental Physiology*, vol. ii. p. 81).

those of the skin. A large quantity of blood is thus forced at high pressure into the uterine capillaries, with the natural result that a hæmorrhage ensues. The amount of this menstrual hæmorrhage is considerable. It is estimated at about one-twentieth of the whole of the blood in the body, *i.e.* 200 grms., or about ʒvij.

In the light of these facts it is comparatively easy to understand the otherwise difficult subject of the causation of the sudden suppression of normal menstruation to which all women are more or less liable, an event which is always fraught with unpleasant, and occasionally with alarming, consequences. For it is evident that anything which profoundly alters the balance of blood pressure upon which the menstrual flow depends, will have for one of its results the cessation or increase of the flow. An interesting case in point is described by Dr. Francis Hare,(1) where the inhalation of amyl nitrite immediately checked a normal period. Moreover, when a menstruating woman happened to be the victim, the orgies of blood-letting in which our forefathers delighted were always followed by the same result. In the one case the drug dilated the systemic arteries and removed the increased pressure brought about by their constriction ; the conditions necessary to the hæmorrhage from the uterine mucosa being thus no longer operative, the hæmorrhage ceased. In the other case the pressure was reduced by the withdrawal of the blood, and the remaining force was insufficient to continue the flow.

It is the same in the case of the emotional ebullitions, which are known to be potent in the same direction. These ebullitions are accompanied by blushing and other objective vascular

phenomena, but also by syncopes, faintings, and the like, which, though less obviously vascular in origin, are none the less truly and definitely so. And these nervous disturbances, transitory, like the effect of amyl nitrite, though they be, are sufficiently profound to alter the distribution of pressure to the point of causing the cessation of the hæmorrhage until the next period. The prolonged absence of the menses which occurs in tuberculosis and other wasting diseases, in typhoid and other acute and subacute conditions, is susceptible of a similar explanation. For in these the subacute and chronic congestions which are of the essence of the diseases, necessarily disturb the rather delicate vascular balance upon which the appearance of the catamenia depends. Moreover, in all wasting diseases, the general blood pressure is usually so low as to prevent the necessary concentration on the uterine vessels.

In thus briefly recounting the circulatory aspect of the menstrual flow, I must not be understood to suggest that a mere hæmorrhage comprises the whole phenomenon. The fact that menstrual fluid does not normally clot as ordinary blood does, is sufficient to establish a wide difference between the two, and the further fact that menstruation is accompanied by ovulation suffices to invest this particular hæmorrhage with very special characters, the meaning of which will be presently considered.

This elaborate and complicated process, which commences about the fifteenth year and ceases about the fiftieth, is repeated at regular intervals of about a month during the intervening period. It is thus a rhythmical process dominating and engrossing the whole of that phase of the individual's life. It is essentially a preparation for reproduc-

tion, and if impregnation fails to take place, there is what is called an " organic disappointment " ; the blood accumulated in the peri-uterine vessels for the nutrition of the fœtus is discharged, and the preparatory process is immediately recommenced. In the continued absence of fertilisation and of pathological disturbances, this cycle is repeated regularly from month to month until the menopause comes to proclaim that the reproductive period is at an end. The inter-menstrual weeks are not in any true sense weeks of repose from the preparation for reproduction. They are merely weeks of quiet and unobtrusive marshalling of forces which concentrate for the next molimen, and although the marshalling is unaccompanied by any objective sign, its work proceeds as regularly and inexorably as the tides on the seashore. Menstruation is too often regarded as if it were a spasmodic explosion, but Nature, in her physiological moods, dislikes a hurricane as cordially as she abhors a vacuum.

The elements which are thus gradually marshalled together during the intermenstrual period are intended for the nutrition of the fœtus, and are therefore, according to Dr. Francis Hare,(2) mainly carbonaceous in composition. In the absence of impregnation their retention is not only useless but positively harmful, so that menstruation must be regarded as a truly depurative or excretory process. The discovery of new facts in medicine has always had a tendency to obscure existing truths to the extent even of causing the latter to be so long buried as to necessitate their eventual rediscovery. Something of this kind appears to have happened in connection with the excretory value of the menstrual function. The excretory

value has been recognised since the days of Hippocrates, and was insisted upon up to the time of the discovery of ovulation. Then, however, it became so overborne by the importance of what was, after all, but a concomitant and associated act, that it became completely submerged. It is scarcely credible that an authority as great as Lawson Tait, and writing as recently,(3) should have gone so far as to refer to menstruation as " this curious and objectionable phenomenon for which no one has ever yet suggested a useful object." That this object is mainly excretory there can be no manner of doubt. The materials which had been accumulated for the reception and nutrition of the fertilised ovum being no longer required, they are discharged, and with them, quite certainly, various other matters which the economy finds it convenient to expel by this route. In connection with these other matters, it is pertinent to recall that chronic metabolic and excretory disturbances, such as gout, are practically unknown in menstruating women ; whereas, after the menopause, females are just as liable as males to suffer in this way. It is also well to remember that the excretion of urea is much increased immediately before menstruation, and much diminished thereafter.

But if it be true that the menstrual period is not a mere hæmorrhage, it is equally certain that it is still less a simple excretory process. The phenomenon is, on the contrary, an exceedingly complicated one, to the production of which the internal secretions of various organs would seem materially to contribute. The most important of these organs is, of course, the ovary, a vast deal of knowledge concerning whose functions has been accumulated since the operation of ovariotomy

became common. Certain facts have not been established in connection with the internal secretion of the ovary, which may be summarised as follows:

(*a*) That it is essential, not only to the development, but also to the preservation of the genitalia.

(*b*) That it causes a vaso-dilatation, chiefly of the uterine and peri-uterine vessels, but also to some extent of the vessels in other parts, notably those in nose and larynx. Coryza is a by no means rare accompaniment of normal menstruation.

(*c*) That it exercises an antitoxic effect upon the matters excreted at a normal period. Gautier and Douser ([4]) have shown that menstrual discharge contains four times as much iodine as normal blood, and an amount of arsenic equal to the whole quantity normally present in the thyroid gland.

(*d*) That it gives rise to an increase of the output of calcium salts from the body, and

(*e*) That it has physiological relations with the internal secretions of certain other glands, some of which relations appear to be antagonistic, some complementary, and others of a nature not yet ascertained, possibly catalytic.

Of these other glands, the most important is the thyroid. The exact relation between the ovary and the thyroid is still obscure, but we know that in some respects their secretions work in the same direction whilst in others they are antagonistic. The two are in sympathy in being, both of them, essential to the development and preservation of the genitalia. In the matter of the thyroid this is seen in the excellent results of thyroid feeding, not only in cretinism, but in all types of infantilism. They are in antagonism in their respective general tendencies. That of the thyroid is definitely katabolic, whilst that of the ovary is

definitely anabolic. The one exception to the rule is provided by their respective attitudes towards the salts of calcium, one of the functions of the thyroid apparatus being to fix these salts in the body, while the active ovary aids enormously in their excretion. But the relationship between the two glands does not end here. It is a matter of common observation that the changes which take place both at puberty and the menopause are frequently accompanied by an enlargement of the thyroid gland. It is also a matter of common knowledge that in some women, at any rate, the thyroid enlarges at each menstruation, and in 80 per cent. of women the whole period of pregnancy is characterised by the same phenomenon. Moreover, where there is an insufficiency of the thyroid secretion, there is usually, according to Blair Bell and others, scanty menstruation and partial sterility, and a still greater degree of this deficiency produces amenorrhœa and complete sterility; but see Hertoghe, quoted in last chapter. Further, excessive thyroid feeding has been known in several cases to cause pregnant women to abort.

So far as the vascular effects of the two secretions are concerned, though they are both vaso-dilators, each would seem to exercise its effect mainly if not entirely upon the vessels in certain areas. Neither is thus a general vaso-dilator, but each is a vaso-dilator in respect of certain districts. The district under the command of the ovary is, as we have seen, that supplied by the uterine and peri-uterine vessels; the district most conspicuously under the command of the thyroid is that of the skin and subcutaneous tissues. This is suggested by the distribution of the most obvious symptoms of myxœdema, and is supported by the fact that even apart

from myxœdema and cretinism, the therapeutic effects of thyroid extract are most noticeable in disturbances of the skin and its appendages. It is probable that the vaso-constriction which occurs at the menstrual period to compensate for the uterine vaso-dilation, takes place in the skin; the subjective symptoms point to such a fact. If this be so, the vaso-constriction is probably brought about by inhibition of the thyroid secretion—a probability which gains strength from the enlargement of the organ during the period. The transitory nature of the enlargement negatives all idea of hypertrophy. It is almost certainly a retention, and the retention is affected to permit of the constriction of the cutaneous and subcutaneous vessels.

The position of the thymus in this connection would seem to be that of *locum tenens* for the ovary. At puberty, when the ovaries normally become active, the thymus undergoes a certain measure of fatty degeneration, but in the case of animals castrated before puberty it persists for a long period, and may indeed hypertrophy. As we have already seen, it antagonises the gonads and retards their activities.

Another gland with which the ovary would seem to have intimate relations is the suprarenal. The relation between the two is suggested by the fact that several cases of sexual precocity have been recorded associated with, and to all appearances caused by, hypertrophy and tumour formation of the suprarenal capsules. Atrophy of these bodies, on the other hand, is accompanied by very insufficient development of the pubic hair and genital organs. The association would thus appear to be one of physiological antagonism,

by which activity in the one gland provokes a corresponding activity in the other, and *vice versa*.

From a case reported by Byrom Bramwell,(5) it would seem that the internal secretion of the pancreas is also closely related with the development of the genitalia. He describes a case of infantilism which was cured by the exhibition of pancreatic extract.

To say that there is an intimate connection between the ovary and the mammary glands is to utter a truism, though the exact nature of this connection still remains obscure. The results of treatment with mammary gland extract of certain uterine conditions, more especially menorrhagia and sub-involution, show that the mammæ have an internal secretion which is of importance to the economy. The same may be said of the parotid glands. The relationship of these glands to the ovaries is shown not only by the metastasis which is so liable to occur in mumps, but also by the parotitis which not infrequently accompanies not only marriage but even normal menstruation. These and other facts have induced observers to try the effect of extract of parotid in the treatment of certain ovarian conditions, and good results are said to have been obtained in neuralgias and inflammations in the pelvic organs.

In this rather chaotic concert of harmony and dissonance it is necessary to notice the sounds produced by yet another instrument, namely, the pituitary body or hypophysis cerebri. This, as we have already seen, consists of two parts, the anterior lobe and the posterior, but for reasons already advanced it seems desirable to consider the effects of the organ as a whole. The hypo-

physis is a member of the katabolic side of the endocrine system, and thus antagonises the ovary. In ordinary circumstances it exerts a stimulating action upon the reproductive organs, regulating the menses and promoting lactation. Extract of the posterior lobe has a powerful effect upon unstriped muscle generally, but especially upon the contractions of the uterus. The extract of the whole gland given by the mouth will generally re-establish normal menstruation. That this is not in any degree due to the physiological power of the gland in raising blood pressure is shown by the fact that the pressor substance, which is so active in the form of subcutaneous injections, is completely destroyed by the gastric juices.

The part which the corpus luteum plays in the activities of the female gonad has never been completely determined, but it may be regarded, with Masterman Wood,(6) as a ductless gland whose physical life is short, but whose physiological life is made continuous by a series of new births or replacements. In a normal unimpregnated woman the passing away of a given corpus luteum is attended by the beginning of functional activity in a new one; the female blood stream is thus constantly supplied with luteal essences. In the pregnant woman the same cycle occurs, but here the prolonged existence of one particular corpus luteum is followed by the ordinary rhythm of the unimpregnated state. The function of this elusive little member of the endocrine hierarchy would seem to be largely anabolic, in that it stimulates the parathyroids. Also it seems to influence mammary development, both at puberty and pregnancy.

The period of life at which menstruation finally

ceases is usually quoted as fifty years. The average, even for complete cessation, is probably rather less, and it is quite certain that the phenomena which are liable to characterise the menopause usually make their appearance very much earlier. There may, of course, be no such phenomena. The gradual atrophy of the reproductive organs, which is the essence of the process, may proceed regularly, smoothly, and uneventfully to the final consummation. In the conditions imposed by our present civilisation, such, however, is rare, and as soon as a woman has passed the age of forty it becomes the part of a careful physician to take into account the possible influence of decrescent ovaries in the causation of any condition for which he may be consulted. From what has gone before, it is not difficult to realise that if there is any want of harmony between the involution of the ovaries and that of any of the other organs with which they are so intimately related, the bells of their secretion will become jangled and out of tune, and there are liable to ensue symptoms of many kinds in various degrees of severity, which lend to this particular period not only its clinical importance but the interest of its baffling proteanism.

We have seen that menstruation is to be regarded, first as a hæmorrhage, secondly as an excretion, and thirdly as the result of an internal secretion, one of whose effects is a partial vasodilation which is normally compensated for by a vaso-constriction elsewhere. At the menopause these activities cease, and the cardio-vascular system is called upon to adjust itself to the profound change which is thus effected. I say the cardio-vascular system advisedly, for it is obvious

that it is the heart and arteries which will have to bear the heaviest burden in the new régime. The menstrual hæmorrhage, comparable to a monthly venesection, must mean a monthly relief to the strain on the heart and arteries; a monthly excretion of toxins must purge the blood of impurities, and monthly vasomotor exercises of dilatation and constriction practised over large areas will maintain, as it were, the arteries in good training. That is one of the reasons why women live longer than men. If we assume, as the experience of each one of us entitles us to do, that in a very large percentage of cases the menopause does not occur smoothly, then it is assuredly to the circulatory system that we must look for the earliest and most striking evidence of distress. And the first question to which I think attention should be directed is that of the blood pressure. During the reproductive years the systemic blood pressure is lowest (about 110 mm. Hg) immediately after a period, and it gradually rises until immediately before the next period, when it reaches from 130 to 150 mm. Hg. With the establishment of the flow the pressure again gradually subsides.

This process we know to be effected by the internal secretion of the ovary, supplemented and balanced by some other internal secretion or secretions, amongst them probably that of the thyroid. If, now, the vaso-dilative ovarian secretion gradually diminishes to the point of disappearance, while the balancing vaso-constrictive secretion, instead of diminishing, remains constant, it is obvious that a decided increase of general blood pressure must ensue. Add to this the absence of the pressure-relieving monthly hæmorrhage and the retention of the vaso-

constrictor toxins, and we have the conditions eminently favourable to a prolonged and threatening increase of pressure within the arteries.

Those who will take the trouble to measure this pressure will find that a large proportion of the troublesome symptoms of the menopause are accompanied by a very decided rise. Manometric readings of 180 mm. Hg and upwards are by no means rare, and they obtain for the most part in women who have put on flesh rapidly, and in those whose menopause is effected without the relief afforded by occasional floodings. Dr. George Oliver remarked that what he called a "wet" menopause is prognostically much more favourable than a "dry" one, an observation which my experience fully supports. In this connection the following quotation from Dr. Mary Jacobi ([7]) is interesting and pertinent: "We are inclined to think that an occasional menorrhagia followed by several months' intermittence of menstruation is the typical method of establishing the menopause."

But although high blood pressures are common, more especially in such cases as I have indicated, they are by no means invariable. I have often been surprised to find normal, or but very moderately elevated, readings in women in whom, from their appearance, from the fact of the sudden cessation of the catamenia, and from the nature of their subjective symptoms, I have been led confidently to predict a definitely supernormal pressure. In such cases careful examination of the heart itself has seldom failed to reveal evidence of dilatation, so that the explanation of these cases would seem to be that the retained toxins had concentrated, so to speak, upon the myo-

cardium, which was consequently bending behind a more or less normal blood pressure. In a third set of cases, certainly a small minority, which in my experience is drawn from the upper classes, the blood pressure readings have been quite definitely subnormal. This is difficult to account for, except on the analogy of gout, or, rather, goutiness. I used at one time to think that the blood pressure in this condition was invariably unduly high, but a more extended experience has shown me that this is very far from being the fact. The typically gouty person—the patient, that is, who has receding gums and falling hair, who suffers from acid dyspepsia and a tendency to abdominal obesity—shows as often as not a manometric reading which is subnormal rather than elevated. Why it is that the blood pressure in this condition should tend to the two extremes in cases which otherwise display so much similarity, I am quite unable to say, nor can I suggest any reason why, in the climacteric woman, it should behave in the same way, except by repeating the well-known fact that her metabolic disturbances at, and after, that period approximate very closely to those which afflict men. She retains toxins which she used formerly to excrete, and of these toxins, sometimes the vaso-dilative will predominate and sometimes the vaso-constrictive.

The moral of this inquiry so far as we have gone would seem to be this : Women at the menopause suffer from a large number of distressing symptoms, into any detail respecting which it is quite impossible here to enter. Some of these are merely subjective, whilst others are objective, but whether they be the one or the other, they are always quite definitely circulatory. The

mechanism of these disturbances is still for the most part obscure, but we have in the manometer a method of distinguishing between, at least, two very dissimilar classes, and a means therefore of approaching the treatment of these cases with some degree of intelligence. And the truth is, the ordinary practice of the profession in connection with this matter will bear a little revision. I take down from my shelves a text-book on therapeutics with regard to which I can gratefully testify that it has afforded me invaluable assistance on many occasions, and I turn with eagerness to the section headed "Menopause." Here I find the whole matter comprised in the recommendation of four drugs, namely, bromide of potassium, cannabis indica, valerianate of ammonium, and, as a local application to the head, eau-de-Cologne. Whereupon I close the book with a sigh, and bethink me of the saying of the French physician (8) to the effect that our therapeutic ignorance with regard to the menopause is undoubtedly responsible for the universal unpopularity of the mother-in-law.

The menopause has been truly described as a "physiological castration." The reproductive power of the individual comes to an end, and the purely feminine characteristics pass into a condition of definite decrepitude. Both the aspect and the atmosphere of the person changes. The change is sometimes gradual and uneventful, sometimes sudden and cataclysmic. In some cases, the transition is so violent as to reduce order to chaos, both mentally and physically. In others, no one, not even the patient, would know that a revolution was in progress, so smoothly and uneventfully is the transition effected. The tempestuous cases

are unfortunately the commonest. In women who have an innate masculine tendency, hair is liable to grow on the upper lip and chin, the voice deepens, and the character loses its feminine elasticity and charm. The brain seems to get on to a different line of rails, and cerebration of the masculine type may become more definite. After the menopause women will take an interest in politics and literature who have never heretofore shown any interest whatever in such things. A well-known Frenchwoman expressed this tersely when, at the age of 70, she said, " Quand j'étais femme."

In the matter of the disappearance of the capacity to reproduce, there are some curious facts cited by Rauzier.(9) It is usually considered that sterility follows the menopause, and so, in the majority of cases, it does. There are, however, some well-authenticated instances which show that reproduction may continue for some years after complete cessation of the menses. Thus, one case was observed by Courty of a woman of 46 years of age, who became pregnant six years after the disappearance of her periods. Deshaves reports the case of a woman of 50 who became pregnant two years after her last menstruation. Then there is " la femme de Reycourt," quoted in the *Revue* of Picard, who had three children after she was 95. Lastly, the *Progrès Médicale* of 1883 relates the accouchement at the age of 121 years of a negress in Georgia. Even with the Biblical example of Sarah before us, these cases are very difficult to credit, if only, in the case of the two last mentioned, because of the impossibility of believing in the existence of any one willing to play the part of the father.

In this country the usual time for the climacteric to occur is reckoned as between 45 and 50 years of age. It must, however, be remembered, that the phenomena of the menopause are by no means confined to the function of menstruation, and that these phenomena include various disturbances initiated no doubt by the dying down of the ovarian hormone, but by no means obviously associated therewith. It is important to realise that these disturbances begin before the menses even show the irregularity to which the term "dodging" is applied, and that in some cases the disturbances continue long after the function has entirely ceased. Among the most notable of these is a change in the general character of the individual which we must suppose to be due to an alteration of what our ancestors with deep insight used to call the "humours of the blood." The alteration gives rise to certain subjective sensations, but objective phenomena are not wanting. These are, apparently, mostly vascular in origin. Hot flushes are exceedingly common and exceedingly troublesome. I have known them to be accompanied by a degree of perspiration which saturated the clothing of the victim and unfitted her for many years for any sort of society outside her own home. The general disturbances of nutrition which take place at this time determine the outcropping of certain diseases amongst which myxœdema and Graves's disease are particularly common. Myxœdema is doubtless due to the withdrawal of the ovarian stimulus to a thyroid which could never have been very vigorous.

When the thyroid gland atrophies at this time, it gives rise at first to the "turkey neck" appear-

ance which women so rightly dread, and which they immediately proceed to emphasise by wearing a strangle-band. When in place of atrophy there is mucinoid infiltration, it gives rise to the double chin which is even more unsightly, and even more generally emphasised by the black band which seems to sink into the protuberant flesh.

The obesities of the menopause are always endocrine in origin. Thyroid extract in small doses usually confers some benefit even when the distribution of the adiposity is by no means typically thyroidal. It is not uncommon for a person who has had an enlarged, or, let us say, a full thyroid, to develop a definite goitre at the time of the menopause. This may be accompanied by signs of myxœdema, or by symptoms of Graves's disease; or it may appear as an isolated event without any concomitant findings. Extract of the whole gland, that is, thyroid and parathyroid, especially when combined with iodine, will usually cause its diminution and even complete disappearance. It is however, always to be remembered that, after middle age, thyroid extract is liable to reduce the sugar tolerance to the point of giving rise to glycosuria. The urine should therefore be examined periodically for sugar.

Graves's disease is not, of course, confined to the climacteric, but it seems to have a particular affection for that period of woman's life, and when it does show itself for the first time, at or about the menopause, the prognosis is not, in my opinion, as good as when the endocrine system as a whole receives the help to which it is accustomed from the ovarian tribute. It has become a habit with many who ought by now to know better, to speak of Graves's disease as synonymous with hyper-

thyroidism. Now, although the thyroid gland may be overactive in Graves's disease, it is so in common with other glands, notably the suprarenal, the pituitary, and the thymus. Moreover, the salient symptoms of the disease are due much more to these other glands than they are to the thyroid itself, which, we as know, is frequently not even enlarged. From latter-day investigations it would seem probable that the gland really and primarily at fault in cases of Graves's disease is the suprarenal cortex. We know that the suprarenal cortex is the gland mostly concerned in the emotion of fright, and some one has aptly described the appearance of Graves's disease as one of chronic fright. It is, of course, very generally recognised that the emotion of fright or shock is very frequently present as one of the most important elements in the causation of the disease. Now if the suprarenal cortex is stimulated, it will, in its turn, cause a stimulation of the thyroid and pituitary acting in katabolic concert, and of the thymus acting in anabolic opposition. The enlargement of the thymus in this disease is no longer a question of doubt. It has been shown to be present in a very large proportion of the cases and is, indeed, in the judgment of many, responsible for some of the symptoms which have hitherto been confidently attributed to hyperthyroidism.

The enlarged thymus is clinically not very difficult to detect. I have previously referred to this matter, and need not therefore repeat what I then said. I may, however, here call attention to a clinical sign described by Lissner ([10]) which is described as " a bruit unlike any other murmur, and heard just below and behind the junction of the

sternum and the clavicle; it is more often to be distinguished on the right side, but is sometimes present on both." The sound is not transmitted to other blood vessels, but it is increased by deep inspiration, and never entirely lost during expiration. It is systolic in time. This sound is obviously produced by the pressure of the enlarged thymus upon the vessels as they emerge from the thorax. Some years ago George Gibson, of Edinburgh, had considerable success in treating Graves's disease with suprarenal extract, but his observations have not been supported by those of us who tried the same treatment. The probability is that those who claim success with the treatment by thymus extract are in a more profitable track. Graves's disease is a disease of increased and even riotous metabolism, and stimulation of the katabolic glands would, therefore, seem to be contra-indicated. The thymus, however, being an anabolic gland which hypertrophies in order to counteract the action of the katabolic, its reinforcement would seem to be indicated. The cause of Graves's disease has been shown by McCarrison, and others, to be due to some toxæmic influence, and most of us with any extended experience of the disease are of opinion that the toxæmia arises primarily in the gastro-intestinal tract. At any rate, treatment by suitable non-irritating and non-putrefactive dietary is one of the best means of bringing about or accelerating a return to normal. Relative immobility of the thorax is a recognised finding in Graves's disease: it is also, as we have already seen, an outstanding symptom of Lane's disease.

An accompaniment of the menopause which gives rise to a considerable amount of anxiety is a mastitis. It usually attacks one breast, and for

preference seemingly the left breast. Clinically, it has all the appearance of a neoplasm, but it may be distinguished from malignant disease by the absence of any secondary deposit and the fact that the nipple is not in any degree retracted. Advice is sought usually on account of the discomfort caused by the mere weight of the chronically inflamed bundle of glands. Curiously enough, it is the upper zone of the left breast which is usually affected, that part, namely, which Arbuthnot Lane declares to be attacked in cases of chronic intestinal stasis. Suitable dietary, accompanied by small doses of thyroid extract and the local application of colloidal iodine ointment, will usually cause the disappearance of these swellings. Nevertheless, the possibility of their becoming malignant must never be lost sight of.

In the treatment of the flushes and other subjective troubles which, even in perfectly healthy people, so often accompany the menopause, various glandular extracts have been tried. Many writers seem to have found success with ovarian extracts, but I am bound to confess that that has not been my lot. Extract of thymus is extolled by others, and again, I am obliged to say, that it has not been successful in my hands. Parathyroid extracts have however, in some cases under my care, seemed to do a great deal of good. One case I can recall, that of a medical woman, who had tried everything without success until, at my instance, she took parathyroid, when her troubles swiftly and completely disappeared. For some reason which I do not pretend to explain, ichthyol has been found to lessen these very troublesome manifestations.

These unpleasant subjective sensations which cause so much misery at the menopause very often

induce the victims to seek relief in very undesirable directions. The most common of these is a recourse to alcoholic stimulants. Surreptitious " nipping " is by no means rare, and unless it is remembered and sought for, its effects are very liable to be attributed to the menopause rather than to the alcohol. Nothing is more difficult to detect than chronic poisoning of any kind, and the most difficult of all is chronic alcoholic poisoning. The habit is usually begun too often, alas! on the advice of friends, because the alcohol seems to provide the much-desired stimulant. The victim, however, comes to appreciate the alcohol, not for its stimulant properties, but for its sedative. It is only in small doses that alcohol stimulates; in large doses it is a powerful sedative, and it is the sedative action which the sufferer prizes: it relieves her sufferings. It is for this reason that morphine and kindred drugs are as popular with middle-aged women as alcohol. In spite of its unpleasant taste, I have known paraldehyde to become the constant companion of a menopausic woman.

Dr. Montgomerie Paton ([11]) speaks highly of the treatment of alcoholism and drug habits by the subcutaneous injection of one-third of a grain of emetine hydrochloride. He goes so far as to claim for this treatment that it is specific in all cases. Without being able to subscribe to this very comprehensive claim, I can say with confidence that it does succeed in a very large number of cases of alcoholism. In the treatment of other drug habits I have no experience which enables me to express an opinion. Its great advantage is that it can be applied while the patient is attending to his or her ordinary duties. It is, however, essential that no alcohol of any kind should be taken, at any

rate, at first. I have found it a good plan to put the patients in a home for a week and subject them to a fast for the first two days before commencing the injections. Curiously enough, an alcoholic will consent to abstain from alcohol when he is fasting completely from all food, much more readily than when food of any kind, in quantities, however small, is allowed him. Dr. Montgomerie Paton's treatment with emetine hydrochloride has been successful in several cases under my care, two of which were undoubtedly due to the menopause.

It is perhaps not correct to speak of diseases or maladies of the menopause other than those which are directly concerned with the organs of reproduction. It is, nevertheless, the case that certain diseases, such as Graves's disease, come to bear a particular complexion at the time of the climacteric. Among the most important of these is so-called rheumatoid arthritis. One of the reasons why this condition is peculiarly apt to arise at the menopause may be found in the fact to which Spender, Jones Llewellyn, and C. J. Macalister have directed attention, namely, that many of its symptoms are due to disturbances in the vasomotor mechanism, *e.g.* Raynaud's phenomena. Disturbances of this mechanism we have already seen to be highly characteristic of the change of life. The parts which the joints play in the general scheme of metabolism still await explanation. It has always seemed to me that they are utilised by the economy to elaborate certain material ; that they are, incidentally, organs whose duty it is to prepare certain substances either for conversion or excretion. When we consider that inflammation of the joints is liable to arise as the result of a very

large number of acute general infections, such as scarlet fever, and local infections, such as gonorrhœa, the part which the joints play in general metabolism and in toxæmic conditions is obviously a very important one. The attempt to classify arthritis according to its clinical manifestations has never been really successful. All we know is that signs and symptoms of inflammation of joints, nerves, and fibrous tissue are commonly grouped together as having some pathological relationship. So-called rheumatoid arthritis, as described in the text-books, may be polyarticular or monarticular, the monarticular type being practically confined to elderly people. It is now generally admitted that this protean disease is due in the majority of cases to some infective focus, though the original seat of the infection is sometimes very difficult to find. It is not infrequently located in the tonsils, in the accessory nasal sinuses, in the roots of the teeth, in the appendix, and perhaps elsewhere in the gastro-intestinal tract. Some writers have insisted strongly upon the gall-bladder as being responsible for some of the cases. I may say parenthetically, however, that if the gall-bladder is responsible, then it means that the gall-bladder itself has been infected by the absorption of toxic material from the intestines. In men, a common cause of this kind of arthritis is an enlarged and septic prostate.

The menopause will often light up a rheumatoid arthritis which has hitherto lain dormant. The derangement of the endocrine system, consequent upon the withdrawal of the ovarian tribute, seems to reduce the defensive power of the system to a low ebb, and focal infections which had up to this point been kept at bay, are enabled successfully to

storm the citadel and establish themselves firmly therein. It is not so very long since rheumatoid arthritis was regularly treated by iodide of potassium and guaiacol carbonate. These drugs probably exerted such beneficial effects as were placed to their credit, in virtue of their antiseptic powers. More recently iodides have been given in colloidal form, which is certainly very much more agreeable to the patient. Collosol iodine has been used with considerable success, also collosol manganese and collosol sulphur. Whatever antiseptics are used, however, it is desirable to support the endocrine system by suitable substitution therapy and to reduce the intake of toxins by a rational dietetic régime.

A method of treatment which was introduced by Dr. Midleton, of Bournemouth, is spoken of very highly by many physicians : it consists essentially in placing blisters along the course of the vertebral column and keeping them open with savine ointment, or by some similar means. This is in reality a reincarnation of the principle of the seton—a means, that is, of affording exit to such toxins as the ordinary emunctories are unable to cope with.

But to whatever physical diseases or ailments the climacteric may be said to dispose the patient, it is upon her brain that the weight of the disturbance usually falls. It may be considered normal that woman at this period should experience a lessening of the sexual desire and the wish to attract the other sex, that she should cease to be the mistress of the mate and become predominantly the mother of her children, and that she should suffer from some of the subjective sensations already referred to. But it is seldom

indeed that the change is as uneventful as this. It is common for the subjective sensations to be so overwhelming as to produce, or at any rate to be accompanied by, such a degree of general irritability and unreasonableness as to render the patient increasingly difficult and eventually impossible. Then comes the hypertrophy of the Ego, written with a large capital, groundless fears, obstinate introspection, violent jealousies, sexual perversions, leading often enough to talk about suicide and profound melancholia. This may pass into a condition of dementia so definite as to warrant detention in an institution. I think it would be much better for all concerned if institutional treatment were more frequently advised than it generally is. Alienists are accustomed to deal with such cases on lines most likely to bring relief, whereas the general practitioner's efforts are always hampered and his remedial recommendations nullified by distraught relatives fearful of the stigma of insanity. The prognosis in a general way may be said to be good for those patients who are properly treated, but it is by no means bright for such as are allowed to drift. The mistake which is usually made at the outset is to treat the patient with measures for "keeping up the strength." The condition being essentially one of disordered metabolism, owing to the withdrawal of an organ which is both endocrine and excretory, the proper indication is to limit the intake and accelerate the output—the former by very strict dieting; the latter by purgatives and such hydropathic measures as may be available, for promoting perspiration and an increase of general metabolism. Some years ago I received a request from France to go and visit a lady aged 45 who was undergoing in-

stitutional treatment in this country. The head of the institution was an experienced alienist who told me that the lady was suffering from climacteric insanity. After we had seen the patient, I expressed the view that the trouble had been contributed to, and was being maintained by, overfeeding, and suggested that the lady should be starved for three days. My friend's astonishment was even greater than his incredulity, but on my undertaking the whole responsibility for the physical effects of the proposed fast, he consented. The result proved my view to be correct, for on the second day the patient became quite reasonable, and not long thereafter she was well enough to return home. Of the drug treatment of such cases it is only necessary to say that purgatives should be exhibited freely and sedatives sparingly. The best purgatives are the saline; the best sedative is paraldehyde.

In the last chapter I expressed the opinion that in the normal male there was no phenomenon which could, physiologically speaking, be compared to the climacteric in the female. This view is, however, tenable only when the male is a typical male. Typical normality in the two sexes was tersely defined by Virchow when he said: "Woman is a pair of ovaries with a human being attached; whereas man is a human being furnished with a pair of testicles." Now, complete typical normality in this matter cannot really be said to exist. Every man has some taint of the female in him, and every woman some strain of the male; and it seems to be a fact that even as there is a mutual attraction between the very male man and the very female woman, so there is a mutual attraction between the feminine man

and masculine woman. There are varying degrees of femininity in men and of masculinity in women. When men present a pronounced degree of femininity, as shown by the broad pelvis, high-pitched voice, and feminine tastes, they are masculine only in so far as they possess gonads of male conformation. The endocrine tribute of these organs, whatever it was at puberty, has become predominantly female by the time maturity is reached. These people—and their representatives among women—are spoken of as the third sex, and whatever their practices may be, they are always homosexual in inclination.

The above refers to pronounced cases. There are, however, cases of men in whom the female element is rather less pronounced. They have relatively broad pelves, relatively high voices, and an inclination to feminine tastes, but they are male in the sense of being heterosexual or, more frequently, bisexual, in their inclinations. Such a man is midway between the normal heterosexual male and the completely homosexual male. There are a good many of these partial homosexuals, who though they may be sufficiently heterosexual in early adult life to marry and have children, nevertheless pass into a condition of definite homosexuality at about 50 years of age. This transition in such cases is often attended by some of the nervous and mental disturbances which so often accompany the female climacteric, and many of them display the sexual shamelessness on the homosexual side which is seen in some women at the menopause.

If, then, it is to be admitted that there is ever such a thing as a male climacteric, it must be held to refer to men with a strong homosexual

tendency, and to them only. But in their case it may safely be admitted.

Mutatis mutandis, the above is true of the female who is either frankly homosexual or homosexually inclined. Owing to the strong streak of the male in her, she escapes almost completely from the troubles of the menopause. It is the very feminine woman who suffers a stormy passage through the critical straits ; it is the woman whose whole life has been a willing sacrifice to her husband and her children who finds a difficulty in adapting herself to neuter conditions. The prominent member of the shrieking sisterhood, the tough, nearly amenorrhœic, wholly sterile, virago, has none of these troubles. She prides herself upon "not giving way to such vapours," and becomes definitely and legally, what she has always been potentially, and often actually, a seducer of her own sex.

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CHAPTER V

RED LIGHTS

THE signals of danger which are liable to show themselves as a person reaches the far end of the plateau are many. Chief amongst them are obesity, high blood pressure, albuminuria, gout, and diabetes, though these by no means complete the list. Here I am assuming that there is no such fundamental cause as syphilis in play. In the matter of the first on the list, I have already referred to the fact that obesity of endocrine origin may arise in any one of four glands. It is to be remembered that these forms of obesity are not due to the deposit of real adipose tissue, but to the substance which has been called mucin. It would probably be more correct to term it mucinoid, for it is a tissue which differs materially from true adipose tissue, and in all probability its exact nature varies with the particular gland at fault. In the matter of the thyroid, it would be natural to think of the obesity as more or less similar to that which appears in myxœdema, and so in many cases, of course, it is. But by no means always. It is not safe to assume that an obesity is sub-thyroidal unless there are some concomitant signs pointing to a deficiency on the part of the thyroid gland. The spade hand is commonly spoken of as typical, but, inasmuch as this appears also in pituitary insufficiency, it cannot be regarded as a good

diagnostic guide. Where I am suspicious of obesity being due to the thyroid, I look for the eyebrow sign, and the shape of the palate. The eyebrow sign, as originally described by Hertoghe, consists in a rarefaction amounting in severe cases to complete absence of the outer third, and sometimes two-thirds, of the eyebrow. It is very characteristic, and " jumps to the eye " of the practised observer. A high arched palate reveals an insufficiency of thyroid during the growing period, and when it is present it is well to inquire as confirmatory evidence for a history of adenoids or nocturnal enuresis, or both; for a weakly acting thyroid in the growing period will generally reassert its weakness at middle age. The signs which we are accustomed to associate with fully developed myxœdema, namely, a harsh dry skin, especially pronounced over the area of the triceps, and a malar flush, will often be found even in slight degrees of thyroid obesity. The distribution of the mucinoid deposit is often, but by no means always, confined to the area above the waist-line. The upper arms and the shoulder seem specially prone to this kind of deformity. The supra-clavicular pads are insisted upon in every text-book, but they are by no means invariably present.

The obesity of an insufficiently acting pituitary is of a rather different type. Here the deposit is generally most conspicuous at, and below, the waist-line. The face is of the variety which has been called the " Dutch doll " by Langdon Brown, and by Fernside as the " pudding face." The hair on the face and trunk, especially in the axillæ, is usually very scanty, though that on the head may remain abundant; indeed here

it is often remarkably thick and coarse, in striking contrast to the rest of the body. Such people usually have barrel-shaped abdomens: the woman suffers from premature amenorrhœa and other menstrual irregularities; the men are usually of the type of Froehlich's syndrome—lumpy and hyposexual. Now, although in both men and women the mentality is often extremely bright, this type of pituitary difficulty will often supervene as the result of a pituitary which has become exhausted by excessive action during the growing period, so that there results a person of considerable stature who tends to lose his sexual appetite and competence as he reaches middle age. Two curious diagnostic points, which I have already mentioned as having been described by Cushing, are the absence of half-moons on the nails and the presence of little black moles dotted about the skin. Some writers declare that the half-moons instead of being absent or defective in these cases may, on the contrary, be unusually conspicuous. Cushing has also described a heaping up of the skin about the roots of the nails. I have always regarded a deficiency in the upper lateral incisors as a sign of pituitary deficiency, but Langdon Brown regards it rather as a sign of hypo-gonadism. In any case, the sign generally accompanies an obesity, usually of the pituitary type.

The thymic type of obesity is due to the anabolic influence of this retarding gland, which, as we have seen, is normally a powerful antagonist of the katabolic glands, more especially perhaps of the gonads. The persistent thymus can nearly always be detected in the adolescent and young adult by the presence of dullness, revealed to

careful percussion in the neighbourhood of the manubrium sterni, and by an inspiratory stridor which is easily heard if listened for. That the thymus occasionally becomes reintegrated at middle age is well known: it may account for a certain number of cases of sex disabilities which are liable to intervene at that period of life. It is a mistake to suppose that the *status lymphaticus* is confined to the growing period.

The obesity of gonadal hyperfunction has been studied by various writers, who have taken the eunuch as a type. It is curious that castration in either sex causes the victim to take on, or to approximate to, the secondary sexual characteristics of the opposite sex. For instance, in the male, the breasts usually enlarge and there is an overgrowth of adipose tissue on the hips and in other female situations. In the female the voice deepens, hair appears on the lips, and other signs of virilism supervene. Inasmuch as the pituitary has very close relations with the gonads of an antagonistic and therefore stimulating kind in both sexes, it is not surprising to find that insufficient activity on the part of the gonads produces very similar results to insufficiency on the part of the pituitary, and that the *dystrophia adiposo-genitalis* when it supervenes in later life, as it does far more frequently than is generally supposed, may be due either to pituitary or gonadal difficulties.

There remains the obesity of super-alimentation, which is usually due to overfeeding combined with lack of exercise. Contrary to what used formerly to be supposed, it must, I think, now be admitted that not very many cases of obesity are due solely to a deposit of fatty tissue con-

sequent upon an abnormally large intake. Most cases which seem to be of this kind, act *via* one or more of the endocrine glands. The usual occurrence is that the metabolic side of the endocrine system becomes exhausted from overwork, and the resulting adiposity is in the nature of a pluriglandular insufficiency. The commonest type of so-called simple obesity is presented by the beer drinker, but even in him the deposit does not appear until he has succeeded in breaking down the normal defences of his endocrine system. It must, however, be borne in mind that whenever food is presented to the economy, it is dealt with. Unless it is vomited, which it sometimes mercifully is, it is digested, assimilated, and stored—for a rainy day as it were. When the rainy days fail to appear, and the intake is not reduced, the amount stored increases day by day, and obesity of varying degrees of grossness is the unlovely result. In such cases, fasting and purging are superior to any substitution therapy, however pluriglandular.

For some curious reason, it is considered normal that people between the fifth and sixth decade should put on flesh. This wholly unnecessary accretion is, unfortunately, very common, but except in the case of the usually transient obesity of the menopause, and not perhaps always even then, can it be regarded as in any degree normal. In considering the obese person, it is necessary to look beyond the deposits of external fat and visualise the state of the internal organs, more especially those which, even in thin people, normally have some fat in their neighbourhood. The two principal organs which we may profitably attempt to visualise in these circumstances

are the heart and liver. The amount of fat which the heart will tolerate with seeming indifference is really extraordinary. To contemplate the fatty surroundings of the heart in the cadaver of a fat person is to wonder how this important organ ever succeeded in effecting anything in the nature of a diastole. Certain it is that the amount of fat surrounding the heart in a person, say, of 15 stone, must seriously compromise what may be called the requisite elbow-room of the organ. The same applies to the liver, though in a sense much less dramatic. When this viscus is laden with adipose tissue the fat must seriously interfere with its metabolic activities, and active metabolism in a person in the later years is only less important than that of his circulation.

All writers on old age agree that after the age of 60 it is well for a person to diminish in weight, and that if he fail to do so, it must be regarded as a bad sign. Such is the opinion of insurance companies, who in these matters have good cause to be very alert. Dr. Rabagliati, in a paper read before the Assurance Medical Society in 1915, showed that overweight after middle age is distinctly unfavourable from the point of view of a whole life policy, while underweight is as distinctly favourable. Those of us with any experience in the same direction will fully support this statement. Sir Hermann Weber (1) quotes the saying "Corpora sicca durant"; and Sir Clifford Allbutt, in commenting on this, tells the story of two Yorkshiremen discussing an invalid, a stout man of past middle age. In speaking of their neighbour's failing strength, one of them remarked: "Why, sir, you see 'e 'a nivver *dried in* as 'a owt to 'a done." Shakespeare's "lean and

slippered pantaloon" would surely never have arrived at that stage if, instead of being lean, he had been fat. The obesity of middle age is not usually considered as a disease which demands treatment. But it ought to be.

The treatment of obesity, whether it be of purely endocrine origin or due in part, at any rate, to sur-alimentation, is a question of diet. The general intake must be severely restricted, at the same time as the appropriate glands are receiving their substitution therapy. For the same reason metabolism must be increased by such measures as the state of the patient allows. Thus, massage, exercise in the open air, sun baths, and the like, are all strongly to be recommended, but the most important point is the regulation of the diet on lines which I have already indicated. Red meats and refined sugars should be rigidly excluded, fruits should be substituted for puddings, and the whole intake reduced.

High blood pressure, which is one of the serious dangers of the plateau, requires very careful consideration. It is now generally admitted that this condition, when persistent, is caused by toxæmia, or at any rate by lowered metabolism (*ralentissement de la nutrition* of Bouchard). Such, at any rate, appears to be the explanation of the sustained high blood pressure of advancing years. And just as it is a mistake to suppose that an increase in weight is normal as age progresses, so it is a grave error to regard high blood pressure as a physiological accompaniment of the later decades; the one is just as abnormal as the other, and even more to be dreaded. It is very difficult to say what the toxins are which give rise to hyperpiesis. McDonagh is of opinion that

since the advent of the arseno-benzene era in the treatment of syphilis, over-dosing with metallic preparations is a cause of hypertension seriously to be considered. Syphilis itself is a recognised cause of this condition. One often finds a low blood pressure where one confidently expected a high reading. I remember two brothers who lived together and who were in the same business; they resembled each other physically closely enough for them often to be mistaken the one for the other, and they lived very similar lives; the one was two years older than the other. When I saw the younger one for the first time he showed a very high blood pressure, and I warned him solemnly against continuing his then mode of life, which included a very good table and practically no exercise. The next I heard of him was that he had died of a sudden cerebral hæmorrhage. His brother, who was very much alarmed at this dramatic occurrence, asked me to examine him. To my astonishment, I found his blood pressure quite low, under 120 mm. Hg, and I was consequently able to reassure him on the subject of any danger from apoplexy. About two years later I saw him again, and he was then the subject of abdominal carcinoma, from which he shortly died. Since then I have come to suspect a person who lives well and takes very little exercise, and yet has very low blood pressure, of being a candidate for malignant disease.

It is right to add, that it is not always safe to reassure a man with low blood pressure on the subject of dreaded apoplexy. A man of 70 came to the Insurance Office to be examined for a policy which he required for the purpose of adjusting the affairs of an estate which he had inherited

as the result of the deaths of two of his brothers, both of whom had died of apoplexy. He was a big man, on the fat side, but apparently healthy in all his organs; at any rate, I could find no abnormality, and his blood pressure was not more than 140 mm. Hg. For a reason which it is not necessary to recount, I told him to call and see me again the following week. In the interval he had an attack of cerebral hæmorrhage, and died. Such cases lead one to suspect that although the accessible arterial system may be in good order, there must, nevertheless, be some weak point in the arteries within the skull-cap, and that, as has been suggested by some writers, an arterial sclerosis may, like atheroma, have a very patchy distribution.

In measuring the blood pressure, the inexperienced should never lose sight of the nervous effect which this little operation may produce upon the patient. Sir Clifford Allbutt tells the story of a man in whom he found a very high reading when he did not expect to do so. After a little conversation he elicited the fact that the patient mistook the armlet for an electric apparatus from which he had once received a severe shock. When, with the patient reassured and freed from his apprehension, the blood pressure was again examined, it was found to be normal.

Another fact in connection with the taking of blood pressure which is too often forgotten is that the pressure rises very definitely after a meal. This rise is more pronounced in some people than in others, and is more definite after a full meal than after a moderate one. Blood pressure during sleep is low, but rises rapidly on waking, hence the giddiness of which people past middle

age sometimes complain when they leave their beds in the morning.

It is needless in these days to insist that for the accurate measurement of blood pressure the manometer is necessary. One may, nevertheless, gather some idea as to whether a pressure is unduly high by two facts which can be ascertained without the aid of an instrument. The first is an accentuated second sound at the aortic cartilage. The French writers describe this as a *bruit de taburka*. It is a loud ringing sound which is present in all circumstances. The temporary accentuation of the second sound, which so often occurs in perfectly healthy people under the emotion of having their hearts examined, should not be mistaken for this. The other is the state of the pulse as felt at the wrist. Though the radial artery may not be hard, the sensation given to the finger is that of a wave which is trying to pass an obstruction—that is to say, the pulsation seems to dwell unduly under the examining finger. M. Huchard and other members of the French school have called attention to the fact that, whereas there ought, normally, to be a difference of five or six beats per minute between the recumbent and the upright postures, the quicker beat being upright, in cases of persistent high blood pressure there is no difference in the number of the beats as felt in the two positions. That is by no means always correct, but it may afford some guide to the situation either when a manometer is not at hand or it seems undesirable to use it.

On this question of undesirability, with the sagacity which always characterises him, Sir Clifford Allbutt writes as follows : (²)

"And I repeat that, in spite of our reasonable desire to trace the periods of the arterial tides, we may have to deny ourselves the advantage of frequent observations, and, when made, we shall be wise to keep the records to ourselves. By the finger and the stethoscope a fair notion of the patient's phases can be got; and if we are always silent about figures, whether good or bad, the patient ceases to ask about them, and abides content with general appreciations. We shall tell him truly that as the arterial pressures are very unstable, and our instruments rough, we are guided, not by the gauge only, but by broader views of his conditions as a whole. I have learned that, fallacious as under the patient's anxiety they are, to make incessant pressure observations as tests of progress is unwise. Having got a grip of the case and of its principles, we shall pursue our reasonable methods with as little fidget over details as possible; so long, that is, as the patient is in no instant peril."

Hyperpiesis is a very insidious condition, which even when pronounced, often goes unsuspected. Its presence may be surmised when a man past middle age complains of persistent breathlessness on slight exertion. The occurrence of a slight hæmorrhage, say an epistaxis, may reasonably arouse fears in the same direction. A person with a really high pressure may, of course, bleed from anywhere. He may bleed from his nose or his kidneys; he may have hæmoptysis or hæmatemesis or melæna, and it is quite common for him to bleed either from the gums or the throat. The occurrence of a hæmorrhage, then, however slight and however loudly belittled by the patient, should lead to a very careful inquisition into the degree of strain to which the arterial walls are being subjected.

Within the terms of my present reference it is not possible to enter into any detail on the question of the treatment of hyperpiesis. I may, however, reaffirm my profound conviction that a natural vitaminous and chemically saltful dietary, combined with attention to the needs of the economy for fresh air and exercise, will, if carefully and hopefully persevered with, succeed in removing a persistent high pressure from the danger zone into the confines of reasonable safety, more especially if the scheme of treatment is inaugurated with a fast. Where the readings of the manometer are such as to warn us that the reduction of the pressure is a matter of considerable urgency, the performance of venesection should at once present itself as the most reasonable and practical measure of relief. On this question I must again quote, and not for the last time, that inimitable master of science, sense, and phrase, Sir Clifford Allbutt (vol. ii. p. 116) :

" Yet of venesection for hyperpiesia I have some increasing knowledge. I began some years ago to use it where I dare, and I had experience enough to recommend it, for hyperpiesia, in 1907.(3) Recently I have had under observation, for some time, three patients who have been bled at least twice a year. They look forward hopefully to the operation, declaring that the symptoms of excessive blood pressures are marvellously relieved by it. And a permanent improvement seems to be thus maintained ; but these three cases are beyond the stage of cure, though not of substantial amelioration. It was in such cases, which they recognised by the tight pulse, that our forefathers were wont to take blood freely ; and, I believe, with great benefit. One lady, who has now been bled for some years, after the first bleeding wrote

to me a letter of the warmest gratitude, saying she had found astonishing relief from it, and that many obscure and troublesome symptoms had been dissipated. Her own medical man—Mr. Day, of Baldock—added his testimony to the same effect, and told me that he and his patient together had learned with some precision when venesection should be repeated. Swollen veins on the arms and hands are among the indications of the need. Usually the interval is about six months ; but if the operation seems to be required sooner, there need be no hesitation in shortening this interval. This lady, in later middle life, had been subject for ten years or more to very high and sustained pressures, with a tightly contracted radial artery, and an enlarged left ventricle. There have been no renal symptoms or signs. I cannot doubt that venesection has not only ameliorated her discomforts, but has greatly prolonged her life ; for the range of her blood pressures has been very materially moderated from about 200 to about 160."

I could cite several confirmatory instances of similar benefits from my own less extensive experience. In connection with the treatment of hyperpiesis, let me once more repeat my faith in fasting as the most valuable method by which the system may be unburdened of dangerous toxins. Guelpa's [4] work has never received the attention in this country—or in his own for that matter—which is so richly deserved. Our forefathers were in the habit of prescribing for plethora " a purge once a week, a fast once a month, or a blooding once a year." A fast of three days, or even less, once a month, would render the other two wholly unnecessary.

The question of high blood pressure brings us naturally to that of **Albuminuria.** The album-

inuria which is called alimentary, physiological, adolescent, and postural, need not detain us. The term "adolescent" is suitable to a very large number of purely transient cases, but an albuminuria which persists after the adolescent period is usually regarded as pathological. Such is not my considered opinion.

I have followed up albuminuria in men of considerably over thirty years who have remained *in statu quo* for a period of twenty years, the subjects enjoying perfect health in spite of the slight albuminuria which they occasionally, but not always, showed. If there should be an alimentary factor in such a case, as there often is, a careful dietary from which butcher's meat, excessive sugar, and other irritating ingredients are excluded will always keep the albuminuria at bay. Moreover, I am convinced that more people have occasional albuminuria than know it. In examining large numbers of people for life assurance, I have frequently found albumin in the urine of otherwise perfectly healthy men of middle age who were very much surprised to learn that there was anything at all the matter with them. Cross-examination of such people usually elicited a history of a recent dietetic indulgence, either a City dinner, or some equally flagrant departure from the rules of dietetic simplicity. It is probable that alimentary albuminuria is just as common as alimentary glycosuria. It would, in fact, be safe to say that if every time any one had either albuminuria or glycosuria, a signal were to appear at the end of the patient's nose, a very large number of middle-aged people in the City of London would present that signal from time to time.

It is well known that albuminuria, especially

in young adults, is liable to occur after muscular exercises, but it is a mistake to suppose that it occurs in young adults only. During muscular exercises the general blood pressure is raised; the vessels which supply the muscles are dilated, as are those which supply the integument. If this were not compensated for in some other direction there would not be a rise in blood pressure, but a fall. The necessary compensation is brought about by vigorous contraction of vessels in the splanchnic area. After the exercise there is, necessarily, a reaction. When the exertion has been severe and prolonged, the reaction takes the form of a gradual contraction of the vessels in the skin and muscles, and a gradual compensatory dilatation of the muscles and the vessels in the splanchnic region. If the contraction of the superficial vessels is hastened, as it often is, by cold bathing or a cold shower, the blood is driven inwards with considerable rapidity, the splanchnic vessels dilate to their full extent, and a renal congestion follows. This causes a temporary albuminuria. Apart altogether, however, from the aid afforded by the cold affusion, the reaction from really vigorous exercise is sufficient to induce so great a dilatation of the splanchnic vessels as to give rise to a relative renal stasis.

There is another factor in play which is by no means devoid of importance. This is the increase of waste products engendered by the muscular exercise, which have to be excreted by the kidneys. This combination of increased waste products and the raised blood pressure, is sufficient to cause an abnormal condition of the renal vessels which may easily result in transient albuminuria.

The occasional presence of albumin in the urine,

then, can no longer be regarded as necessarily of pathological import, and even when it is strictly correct to speak of it as unphysiological, its presence does not necessarily mean that the kidneys are seriously diseased. It is known, for example, that in cardiac disease and spinal injuries, albumin is frequently, if not constantly, found in the urine. In myxœdema it is a classical finding, and, inasmuch as the albumin rapidly disappears under thyroid extract, it is quite evident that the infiltration of the kidneys has not given rise to any serious damage to these essential organs. Albuminuria is very commonly present in pronounced Graves's disease, in tonsillitis, even when this is not due to diphtheria ; it is also present in cases of hepatic affections, in migraine, in epilepsy during the paroxysm, and in most toxic pyrexias. It is present as an early sign of tubercle ; it is by no means uncommon in asthma, and in the acute exacerbations of chronic bronchitis. Moreover, a very large number of drugs will occasionally give rise to it. Cubebs, turpentine, mercury, quinine, arsenic, and phosphorus are perhaps the most important, but they by no means complete the list. Passing abnormalities anywhere in the urinary passages may provoke the same symptom ; an excess of oxalates in the urine will occasion it, so will the irritation of gravel. A slight cystitis, such as not infrequently occurs in women, is by no means an uncommon cause. At the climacteric, albumin may frequently be found in the urine, especially if the examination is made at the time when a period might under ordinary circumstances have been expected. The combination of this finding with a certain elevation of blood pressure, which is so common at the

menopause, has frequently given rise to unnecessary alarm. It is therefore, as Langdon Brown [5] properly points out, necessary to distinguish between a chronically inflamed kidney on the one hand, and on the other a kidney which is leaky from slight damage by old disease, and is not therefore the seat of a progressive lesion. When this question presents itself, Langdon Brown suggests that the ratio of albumin to globulin, and the output of diastase in the urine when carefully estimated, will enable us to decide whether the albumin is due to a nephritis or to some old but harmless damage; and he goes on to say that a nephritic kidney not only allows things to pass out which it ought to retain, but, what is of far greater importance, it retains things which it ought to excrete. Many of the symptoms in a real nephritic condition are due to the latter factor, and the writer gives, as an instance, the production of œdema due to failure on the part of the kidney to excrete water and common salt. The presence of albumin in the urine has loomed too large in the diagnostic perspective. Where the albuminuria constitutes the only, or almost the only, symptom, one has no right to express anxiety, unless in addition thereto the urine contains certain definite evidence of structural disturbance in the kidney. Functional disturbance may be, and usually is, purely transitory and devoid of sinister significance.

Attempts used to be made to decrease the amount of albumin in the urine by restricting the protein intake, on the analogy, I suppose, of restricting the amount of the carbohydrates when sugar is found in the urine. The two, however, are not on the same plane. It has been abun-

dantly shown that protein, as such, does not accumulate in the blood, and is therefore unlikely to overflow into the kidney. It is not so much the quantity of protein which matters as the source from which it is derived. When that source is mainly butcher's meat and other material which, in addition to the protein, contain renal irritants, an albuminuria is certainly likely to be intensified; so that, where one wishes to lessen the amount of albumin, it is wise to obtain the protein, not from meat foods, but from dairy produce and such vegetables as peas, beans, and lentils. The discovery of the vitamins has, however, placed the whole question of the proximate principles back into the crucible, and it is more than probable that the amount of protein really required for the maintenance of health is considerably less even than that advocated by Chittenden, which he claimed to be about half the quantity usually considered necessary.

Senator says that every urine will be found to contain albumin if sufficiently concentrated. When the albuminuria is due to mere leakiness on the part of the kidney, calcium chloride, especially when reinforced by parathyroid, will often cause its disappearance.

Gout.—Gout was at one time regarded as the natural inheritance of a well-born man between 50 and 60 years of age, and it is interesting to observe that the great Charcot, writing as comparatively recently as 1874, on the subject of the illnesses of elderly people,[6] devoted almost two-thirds of his book to the question of gout. That gout still exists there can be no doubt, nor can there be any question that the form in which is was known to our ancestors has practically

disappeared. The big-toe gout of the irascible elderly nobleman is now never met with—possibly because the genus nobleman is dying out: there is nowadays very little *otium cum dignitate*. The whole explanation is not, however, by any means plain, but is probably due partly to the increasingly temperate habits in the matter of alcohol in well-to-do people to-day—partly to the improved quality of the alcohol, and partly to the influence of the measures for the public health which have been taken with increasing care and severity since the Public Health Acts of the seventies. It is probable that bad water, bad drains, and insanitary conditions generally, contributed very largely to the type of toxæmia which used to express itself in acute gouty arthritis. When the cesspool was abolished from under the dining-room floor, the aristocratic joint disappeared with it. The goutiness which troubles people at the present time takes the form of gastro-intestinal troubles, circulatory abnormalities, eczema, and other skin manifestations, as well as myalgia, neuralgia, and some forms of chronic arthritis. We are no further in our knowledge of the ætiology of this condition than we were forty years ago. All sorts of theories have been advanced, many of which have been partially correct, but we can reduce them to their common denominator by assuming that gout, or goutiness, whatever form it may take, is due to a toxæmia of gastro-intestinal origin. The way, therefore, to deal with gout is by general dietetic and hygienic measures, to which sufficient reference has already been made.

It seems to be certain that some, at any rate, of the toxins which give rise to the gouty habit

are more readily excreted through the skin than by other routes. It is only thus that we can explain the very decided benefits which patients who suffer in this way so often derive from baths, massage, and treatment of that kind. The drug which does most good in such cases is iodide of potassium, a fact which supports the view that the cause is a toxæmia which is neutralisable by so efficient an antiseptic as iodine.

Although the uric acid theory of gout has been severely scotched, it cannot be considered as altogether dead. It originated with Sir Alfred Garrod, who found that in gout there was an excess of uric acid in the blood; and, during an acute paroxysm there was a diminished output of uric acid in the urine. From uric acid the field was enlarged by late observers, to the purin bodies generally, and it was thought that by limiting the amount of the purin intake, the uric acid and its congeners would become less troublesome. This theory, however, plausible as it seemed, failed to work out in practice. As Goodhart humorously exclaimed: "The cry is, get the uric acid out of your system and all will be well; but though you absolutely exclude all uric acid-forming food, of whatever kind you assume that food to be, you may wither up your patient into a shrivelled, useless, prematurely-aged being, and there will yet, by some means or another under favouring conditions, be squeezed out of his tissues enough uric acid to form a large deposit of red crystalline matter in his urine."

It was not until considerably after Goodhart's time that the uric acid theory, which he did so much to discredit, gave place to one which was less open to obvious criticism. Walker Hall and

others originated the view that gouty individuals possess some inborn defect of nuclein metabolism, and it is now considered more than probable that gout is, in fact, one among the many deficiency diseases—the diseases, that is, which are due, in part at any rate, to an insufficiency or imbalance of vitamins and chemical salts in the economy, giving rise to a defect in the katabolic side of the endocrine system. A rigid "natural" diet certainly keeps the enemy at bay.

Diabetes. — Bouchard (7) says that there is a relationship between diabetes, chronic rheumatic or gouty obesity, migraine, asthma, and eczema. This is only one way of saying that all these troubles are liable to arise from the same or a similar cause, which is in effect some inborn or acquired error in metabolism. The French classify diabetes as pancreatic, nervous, and constitutional. They regard the disease as essentially one of cold climates, which attacks men more often than women; a disease of sedentary life with especial affection for the emotional Semitic race, and favouring especially hard thinkers and those who, like workers on the Stock Exchange, are liable to sudden and considerable anxieties. Claude Bernard, indeed, went so far as to say that one-third of the members of the learned societies in France became the subject of diabetes. In this country, where, presumably from its prevalence, considerable research has been expended upon this mysterious disease, we have learned to distinguish between diabetes and glycosuria. I have already referred to what the French call "nervous" glycosuria—the glycosuria, that is, which comes from sudden and violent emotion, chiefly that of fear, where the blood sugar mobilised for use in the muscles is not so used, and conse-

quently finds its way into the urine. That however, is only one form of glycosuria which it is necessary to distinguish from the true diabetes arising from a failure on the part of the islet cells of the pancreas.

Langdon Brown, whose writings on this subject are full of instruction, refers to "renal" glycosuria and "diabetes innocens," both of which, though rare conditions, should carefully be borne in mind. Renal glycosuria is a condition in which a lesion of the kidneys may give rise to increased permeability of that organ to ordinary content of blood sugar. Where there are concomitant signs of damaged kidney, such as albuminuria and retinal changes, the fault is clearly not with the organs which give rise to diabetes. In order to understand diabetes innocens we must realise, again with Langdon Brown, that the

"centre of interest, as far as sugar metabolism is concerned, has shifted of recent years from the urine to the blood.

"Important methods allowing the blood sugar to be estimated in a single drop of blood have greatly simplified observations on this point. The normal percentage of sugar in the blood plasma, during fasting, may be taken as 0·1 per cent., and this is approximately maintained through prolonged starvation, almost up to death. Graham showed that 100 grms. of dextrose would produce a sudden rise in the blood sugar within ten minutes, usually reaching its maximum in under twenty minutes, and returning to its original level in one to one and a half hours. The determination of the sugar in the blood, at intervals, after a dose of dextrose, is the only way to obtain information as to the real condition of affairs. The level which the blood sugar has to reach before it appears in the urine shows considerable variation in different individuals,

As Graham puts it, some have a high, and others a low leaking point. In diabetes, hyperglycæmia will persist long after the glycosuria has been controlled, and may remain at a figure such as 0·25 per cent., which in an ordinary individual would inevitably excite glycosuria, as if the kidneys had acquired a raised threshold for sugar. On the other hand, there may be glycosuria with hypoglycæmia."

Since the introduction of insulin, it has therefore become of paramount importance that we should learn to differentiate between renal glycosuria and true pancreatic diabetes. Professor Hugh MacLean ([8]) has carefully studied this question, and he found that a good many of the patients presenting themselves for his advice who were being treated for pancreatic diabetes were, in fact, suffering from renal glycosuria. Now, as insulin reduces the percentage of blood sugar, if it be given in cases of renal glycosuria where the blood sugar is normal, it may reduce that blood sugar below the level of safety. The exhibition of insulin thus constitutes a form of treatment which should not be recommended until, by the estimation of the blood sugar, a complete diagnosis has been made. MacLean very rightly says that the practitioner is so far not equipped for making the necessary blood tests ; he has neither the time nor the practice to do so with the necessary degree of accuracy. What is wanted is an apparatus, not too expensive, and a method which is not complicated. MacLean promises such a method, and if it materialises it will be a great boon to the busy physician. In these days when the knowledge of glycosuria from all causes is advancing with such rapidity, it is very desirable that the practitioner should be able to obtain a

true clinical picture in as short a time as may be. Moreover, when sugar is detected in a person's urine he is liable to demand insulin at the point of the bayonet, and there should be some ready means of persuading him against thus compassing his own undoing.

In addition to renal glycosuria, we have to recognise that there is a thyroid glycosuria. It is well known that administration of thyroid extract will induce a glycosuria in a person who has never before been the subject of this condition. In view of the unfortunate fact that the man in the street is able to obtain thyroid extract, to almost any amount, across the counter, if sugar should be found in the urine of a patient where the symptoms do not point to such a finding, it is well to inquire very closely as to whether thyroid extract has been taken or not. The majority of the people who take thyroid extract surreptitiously are women, who take it with the object either of reducing their bulk or of improving the growth of their hair. It must, however, be admitted that men are not entirely immune from such weaknesses. Glycosuria of a mild sort is by no means an infrequent accompaniment of Graves's disease. The so-called adrenalin glycosuria is due to temporary emotional causes ; these have already been considered in connection with fright, flight, and fight, and need not, therefore, be repeated here.

Over-secretion in the pituitary may also give rise to glycosuria. The over-secretion lowers the sugar tolerance to a point where the kidneys are not prepared with a sufficient barrier, and the sugar appears in the urine. It is thus apparent that over-action on the part of any of the katabolic glands—adrenal, thyroid, and pituitary—may cause

sugar to appear in the urine, and that under-action of the great anabolic gland, the pancreas, will give rise to the same result. It is, therefore, necessary to insist once more upon the difference between true diabetes of pancreatic origin and glycosuria of sympathetic or katabolic origin, the treatment of the condition in the two cases being widely different.

Before the advent of insulin we were in the habit of treating diabetes by subjecting the patient to Allen's starvation diet, euphemistically called "alimentary rest." According to this scheme, which was in reality originated by Guelpa, when, after three or four days' complete fasting, the sugar had disappeared from the urine, food, with gradually increasing amounts of carbohydrate, was tendered cautiously, until the point of tolerance was reached. There would then follow a further fast until the sugar had again disappeared, and the patient was given a dietary containing an amount of carbohydrate with which he could deal comfortably. If the balance thus arrived at was enough to maintain life and yield a sufficient amount of energy, the results were usually very good. It must be admitted, however, that the cause in such cases was not attacked, any more than it is attacked by Banting's insulin treatment.

Both of these lines of treatment are a very great advance upon the old method of strict limitation of carbohydrate and a corresponding increase of protein foods. That method, now fortunately quite discredited, served only to increase the metabolism in circumstances where it was already too high, and proved to be very unsatisfactory in most cases. My own experience leads me to believe that in dieting glycosurics a very important factor in raising the sugar tolerance is a sufficiency

of vitamins, and the presentation of the carbohydrates in natural, as opposed to artificial, forms. I can, for instance, confirm the experience of others that fructose in reasonable quantities, when obtained from raw fruits, is very much better tolerated than any other form of carbohydrate; and can affirm that when ingested in a covering of raw cellulose, as in salads, the carbohydrate does not readily produce glycosuria.

Before leaving the subject of diabetes, it is necessary to glance briefly at the condition known as **Acidosis.** Acidosis has been so frequently considered in terms of diabetes, and as though it arose under no other circumstances, that it seems necessary to emphasise the fact that it is caused by a great many conditions which have no connection with this disease. In its minor forms it is responsible for a good deal of vague ill-health, which is unsuccessfully attributed to other causes, and wrongly treated in consequence. Poulton (9) has thrown a good deal of much-needed light on this question by calling attention to the very wide area in which acidosis exercises a baneful influence. Acidosis was defined by Barthrop as an increase of acid in relation to basic radicles in the blood; CO_2 not being considered. It may arise, therefore, either from an excess of certain acids, such as diacetic acid and lactic acid, or from an insufficiency of appropriate alkalies. Acidosis is a physiological condition. It is only when it is excessive that it becomes pathological. If, for example, there should be an insufficiency of oxygen in the blood, lactic acid is produced. This stimulates the respiratory centre to increased effort, with the result that dyspnœa results and the lungs become more thoroughly venti-

lated. This is exactly what happens when muscular exercise is taken. People who indulge much in physical exercise in order to work off their dietetic excesses, should therefore be advised to drink alkaline fluids when the exercise is over. Vichy water, which contains bicarbonate of soda, is very useful for this purpose, but ordinary water and ordinary bicarbonate of soda will do as well. In this matter it is necessary to distinguish between acid foods and acid-forming foods. The vegetable acids play the part of alkalies in the economy, because they become converted into bicarbonates. A lemon squash would therefore be as suitable as Vichy water, were it not for the added sucrose which usually disfigures the former. The acidosis which arises from excess of acid is much more common in large meat-eaters than in those who live on a rational diet, but violent exercise is liable to cause it even in fruitarians.

The production of acidosis by the relative absence of appropriate alkali is produced when people ascend to high altitudes. Here, even when the body is at rest, the ammonia normally formed from the tissue proteins is considerably lessened; the acid in the blood is, therefore, relatively increased, the acidosis arising merely as a result of the disturbed physiological balance. If this balance remains uncompensated, unpleasant symptoms will surely appear, for there ensues a true acid intoxication which, if pushed far enough, will give rise to a condition resembling diabetic coma. People who intend going to high altitudes, as for winter sports, should be warned to drink plenty of alkaline fluids for the first few days after their arrival.

Starvation, however induced, is liable to give

rise to acidosis. It is therefore commonly present in œsophageal or gastric carcinoma, in the cyclical vomiting of children, in the pernicious vomiting of pregnancy, and in puerperal eclampsia. In post-anæsthetic poisoning there are symptoms which point to the presence of acidosis, though this may not be the entire cause. Marriott, Howland, and Langdon Brown consider that acidosis, when it gives rise to toxic symptoms, is due to the failure of the kidneys to excrete the acid phosphates. It is not uncommon to find symptoms of acidosis in people who, though not fasting, are suffering from physiological starvation through unsuitable foods. This may sometimes be the key to the discovery of surreptitious fasting, which is occasionally undertaken by hysterical women or by those who are anxious to reduce their size. I have known acidosis to occur in the treatment of obesity, as the result of a too rigid dietary which excluded all fats and carbohydrates, and greatly increased the proteins. It is probable that our forefathers recognised acidosis as a clinical entity and described it under some other name, otherwise they would not have had the profound faith in alkaline remedies which is shown in many of their prescriptions. The salts of sodium and potassium, especially the latter, are very efficacious in the treatment of this condition, for which they may be prescribed in large doses. Inasmuch as fasting as a therapeutic measure is frequently recommended in this book, let me repeat that people who are undergoing this treatment should be enjoined to drink plenty of alkaline fluids during the abstinence from food. A mild degree of chronic acidosis, or, probably more correctly, subalkalinity, is the cause of a good deal of vague unfitness, and shortness not only

of breath but of temper. Alkalies and vegetable acids which, by being converted into carbonates, play the part of alkalies in the system, with a complete withdrawal of fats, will often convert a morose man into a happy one.

I have sometimes been led to wonder whether a state of what may be called sub-acidosis is in any way responsible for the effect which weather changes produce in so-called gouty people. It is certain that some persons are "human barometers," and having regard to the power of high altitudes to provoke acidosis in the healthy, it is at least conceivable that weather of a certain type may have a similar effect in the case of those with a predisposition thereto. In any case, the "human barometer" awaits explanation. He presents a problem, the unravelling of which might assist in the solution of many others. There are obviously many effects of climate which are at present a closed book to us. It is probable, for example, that Shelley's poems would have held a different flavour if they had been written in England instead of in Italy.

In any consideration of the diseases of the plateau it is impossible to avoid giving some attention to that most dreaded of all diseases, namely, **Carcinoma.** The pathology of this condition is still very much in dispute. There are some who stoutly maintain that the disease is due to a parasite, but the majority of pathologists do not accept this view. A great deal of research, some of it exceedingly helpful, has been expended on this subject, more particularly at the Middlesex Hospital, but from all the work which has been done there or elsewhere, there emerge only two propositions of general interest which may be

formulated concerning its causation. The first is that cancer may be excited by long-continued irritation; the second, that the primary growth tends to occur in the later years of life. Another very arresting point in connection with the disease is that, in spite of a good many quibbles on the subject, there can be very little doubt that cancer is seriously on the increase. Carcinoma is essentially and emphatically a disease of civilisation. The evidence to this effect is so overwhelming as to brook no denial whatever. The facts adduced on this head by McCarrison, coming from such an authority, are so convincing as to render further discussion unnecessary. McCarrison "never saw a case of asthenic dyspepsia, gastric or duodenal ulcer, of appendicitis, of mucous colitis, or of cancer during nine years' practice in a remote part of the Himalayas." His surgical work averaged over 400 operations a year. "The occasions," he writes, "on which my attention was directed to the abdominal viscera of these people were of the rarest. I can, as I write, recall most of them, occasions when my assistance was called for in the relief of strangulated hernia, or to expel the ubiquitous parasite *Ascaris lumbricoides*."

On the question of chronic irritation, we have to remember that the gastro-intestinal canal is the seat of a very considerable number of the carcinomata which are met with in ordinary practice, and, as I have already attempted to show, the present dietetic habits of the people supply the element of chronic irritation in a very high degree. I am, moreover, not concerned to combat the view that some sort of parasite may be partly responsible for the manifestations of the disease. My reply would be that you must go beyond the parasite,

and ask how it is that he is allowed to flourish on a soil which was never intended to receive him. The answer again is, that the soil is chronically irritated by unsuitable foods. In spite of the improved methods of diagnosis of which, it seems to me, a good deal too much is being made, it cannot be denied that we hear far more of cancer, both in hospital and in private, than we did thirty years ago; and it is precisely during that period that we have, continuously and with grim determination, been devitalising our foods and reducing our powers of resistance. Malignant disease which so often overtakes man during his sojourn on the plateau is the result of many years' defiance of some of nature's most obvious laws. We have lived in ignorance of some of the most important of those laws until quite recently, and it is to be hoped that a wider dissemination of the means of simple and healthy living will give rise to a real diminution of this scourge during the generations which are to follow us. A book written by a layman ([10]) and addressed to laymen, recently published, contains a great many facts and considerations which members of the profession might profitably lay to heart and brain.

In these days when the popularity of vaccines, sera, and remedies of that class threatens to elbow our former means of treatment out of existence, it is essential that the practitioner should be cognizant of such facts in connection with the curious phenomenon of **Anaphylaxis**, as the study of this question has so far revealed. The whole subject, which is of comparatively recent origin, was opened up by a mere chance. In 1902 Professor Charles Richet, working in his laboratory in Paris, injected a dog with a small dose of poison derived from the

tentacles of the actinia, with a view to immunising the animal against larger doses. His attention was then distracted from this particular matter, and his time was fully occupied for over three weeks. On the twenty-second day after the injection, he found himself free to return to the matter of the dog whom he desired to immunise. He therefore repeated the original injection, giving exactly the same amount of the same poison, hoping to produce a condition of "prophylaxis." To the professor's great surprise, before he had even finished the little operation, the animal became extremely ill, and died in thirty-five minutes. This being the exact opposite to "prophylaxis," he christened it "anaphylaxis." It seemed at the time that the death of this animal must have been due to a pure accident, because, though well acquainted with what is called the negative phase in the injections of poisons and vaccines, Richet was unable to persuade himself that the death of the dog could be due to a repetition of a dose which originally had caused not even a trifling inconvenience to the animal. His doubts notwithstanding, he published the facts, and the question has since been closely studied by many observers, prominent amongst whom, in this country, has been Professor H. H. Dale. The general opinion amongst those who have paid serious attention to the matter is that the phenomenon is due to the same train of events as that which produces immunisation, but that, instead of producing immunisation, it produces sensitisation—that is, a minus instead of a plus. It is now recognised, however, that anaphylaxis is not produced by the same mechanism as immunity. The anaphylaxis, it seems, was not due in any degree to the poison in the

injection used by Richet, but was caused by the protein which accompanied the poison. It is now accepted that protein of any kind, whether it be horse serum, milk, white of egg, or that obtained from a cereal, has the power of "sensitising" an animal to another injection of the same protein. In order to produce anaphylaxis, however, an incubation period of some ten or more days is necessary. If the second dose be given during the intervening period, anaphylaxis will not be produced, but if the period of incubation has been reached, or passed, a second injection of the protein will immediately produce anaphylaxis. After the second or exciting dose, the animal immediately shows signs of discomfort, respiration becomes quickened and then laboured; this is accompanied by diarrhœa and melæna, tetanic spasm, opisthotonos, followed by paralysis and collapse. This alarming, and generally fatal, train of events has been observed in a great number of cases in the lower animals. Unfortunately, it also applies to man. Frank Coke,[11] who goes very fully into the explanation of the phenomena of anaphylaxis, especially in relation to its association with asthma, to which I shall refer later, gives the following instance:

'A medical practitioner, resident in India, gave himself an injection of anti-plague serum. Not until a year had elapsed did he give himself another injection of the same serum. Immediately after this second injection he was seized with fainting fits, asphyxia, and coma, and died in a few hours."

The curious point about the occurrence of anaphylaxis, however caused, is that anæsthetics seem to prevent it. If an animal is anæsthetised for the purpose of giving the second or exciting

dose, anaphylaxis does not occur, and there are no unpleasant consequences of any kind. Some experiments go to show that if the liver is clamped out of the circulation, anaphylaxis fails to appear until the clamps have been removed, when it supervenes rapidly and is followed by the usual train of symptoms. It would seem that urticaria and other skin manifestations are liable to occur with mild attacks of anaphylaxis, a fact which explains to some extent the phenomena of serum rashes. The lesson which we have to learn from these facts is that all foreign proteins, when injected into the human body, are liable to cause anaphylaxis. If, however, the second injection is given before the period of incubation is over, and is given in doses which, in any case, would be too small to produce anaphylaxis, the alarming symptoms fail to appear, and sensitisation does not occur. Another point of safety is that if the doses ar given intravenously instead of subcutaneously, they must be administered not only in very small amount, but extremely slowly.

The usual methods of giving foreign proteins are—subcutaneously, intravenously, intrathecally, intramuscularly, or intraperitoneally : the intravenous route is at once the most efficacious and the most dangerous. The ramifications of anaphylaxis are considerable. Thus, if the blood of a guinea-pig, sensitised to a particular protein, be injected into a normal guinea-pig, the latter soon becomes sensitised to the protein in question, an ordinary injection of which will at once cause anaphylaxis. Moreover, if blood be taken from the original sensitised guinea-pig, mixed in a flask with a fresh solution of the original protein, and this mixture is injected into a normal guinea-pig, the

latter is at once overcome by anaphylaxis. Coke gives the following instance, quoted from Ramirez:

"A man was transfused with 600 c.cm. of blood from a donor with apparent success; a fortnight later on going out for a drive he was seized with violent asthma, of which he had previously never had an attack. It was then found that the donor from whom he was transfused was an asthmatic who was sensitive to horse dandruff. That meant that the sensitisation of the donor had been transferred to the receiver, and had completely sensitised the latter to the same protein. A curious fact is that another man who had received even more blood from this same donor did not develop any condition even resembling asthma in the presence of horse dandruff."

Coke ([12]) writes as follows:

"The first question he may rightly ask is—What is anaphylaxis? The answer at present is—Nobody knows. If certain experiments are performed on animals, foreign proteins being injected into them, certain results follow, but when it becomes a question of explaining these results we have either to answer honestly that we are ignorant, or enter into a discussion on the various theories available, which brings us back to the same conclusions only by a longer and more difficult route.

"I believe that while immunity and anaphylaxis are exactly opposite in their manifestations—an increased tolerance to a vaccine on the one hand, and a violent hypersensitiveness to a foreign protein on the other—they are really entirely different phenomena, and not opposite ends to the same sheet."

In connection with anaphylaxis there are some other mysterious phenomena concerning which it is desirable that the latter-day physicians should be possessed of a working knowledge.

Since the existence of bacteria was first demonstrated by Pasteur, efforts have been made either to kill the micro-organisms themselves or to nullify the poisons which they emit. These efforts originally took the form of injecting dead microbes into the human body in the hope that the production of antibodies would thereby be stimulated. This method, though successful to a certain extent, was found wanting in really bad cases in which the power of response to the stimulus was insufficient. It was like whipping a tired horse. It therefore occurred to some one to manufacture the necessary antibodies by injecting the dead microbes into the living tissues of another animal. The blood, or rather the serum, of this other animal thus charged with antibodies was then injected into the human patient. The success of this plan in diphtheria and tetanus was very conspicuous, but in other diseases it failed. It was found, later, that the injections of horse serum did a great deal of good to people who were not suffering from the specific disease with whose antibodies the serum was charged. Sir Almroth Wright, for example, found that prophylactic vaccination against typhoid had an astonishingly good effect upon many chronic diseases, including arthritis and eczema. It was then borne in upon workers in this field that the protein in the horse serum was responsible for at least some of the good effects which had so far been attributed to its contained antibodies, and that the beneficial effects of the serum containing antibodies to a particular disease, say tetanus, were by no means confined to that disease. They were, on the contrary, shown to be useful over a very wide area. Serum thus came to be used for its protein rather than for its antibody content.

Experiments were then made with other more easily available proteins, such as milk and egg albumin, and these were found to act much in the same way as the horse serum. A further stage was reached when it was discovered that all these proteins, serum, milk and egg albumin, produced their effects by shock, and that acute infections, such as pneumonia and typhoid, when subjected to this protein shock, were immediately aborted.

It comes, then, to this; that all these foreign substances, whether they be vaccines or sera or more homely proteins, produce their effects by rousing something in the human organism which, when sufficiently roused, but not too much, is capable of ousting an invader and of restoring the command to the home government. The exact mechanism of this awaits explanation, but, having regard to our acquaintance with the fact that the responsibility for dealing with toxins of all kinds is vested in the endocrine glands, it would cause no surprise if the explanation of these phenomena should eventually prove to be what mathematicians call a "function" of the endocrine system.

It is the opinion of some authorities, Danysz [13] for example, that it is possible to have too much antibody. He lays the blame for a great variety of chronic maladies on what he calls "l'anticorps en excès," and gives experimental reasons for the faith which is in him. Here, again, we are in the presence of a question of balance. If the antibodies are deficient, they should be roused, but if they are not deficient, measures taken to promote their increased production will result in their presence in excess, which excess the endocrines are probably called upon to dispose of; and this leads

to the exhaustion of the endocrines. This view is supported by the nature of the diseases mentioned by Danysz as resulting from *anticorps en excès*, namely alopecia and several skin diseases, together with arthritis and bronchial affections.

Considerable as is the amount of work which has been expended upon the subject of immunity by vaccines and sera, the whole question must be regarded as still in a state of flux. A point which has recently emerged from the work of Besredka is that, in disease, immunity is often a special function of a particular tissue, and not, as was formerly supposed, the concern of the body cells and fluids generally. Since certain diseases produce their most striking lesions in certain tissues, it is those particular tissues which should be attacked by the immunising agent. It is, for example, practically impossible to immunise against dysentery by the subcutaneous route, whereas Ch. Nicolle ([14]) has shown that it may be easily accomplished by the intestinal route. If this principle is applied to gastro-intestinal diseases generally, we may soon see, in the treatment of these diseases, the disestablishment of the hypodermic needle and the restoration of the measure-glass. The principle has already been applied with very conspicuous success by Goldenberg to the treatment of pyorrhœa alveolaris. Injections of a very concentrated stock vaccine are made into the gums, with results which appear to be uniformly successful. The preparation [1] is certainly deserving of an extended trial, if only as a possible means to put an end to the fierce and fantastic fashion of wholesale extraction which now dominates the situation.

[1] Inava. (Thomas Christy & Co.)

The non-specific as against the specific action of sera has already been referred to. Sir Almroth Wright has recently shown ([15]) that the same principle holds good in the case of vaccines. As quoted by Dible

" he found that the addition of a culture of organism to blood, outside the body, causes a liberation of anti-substances, occurring rapidly and at once, which results in the blood becoming highly bactericidal. Following out these observations, it has been further found that the same phenomenon takes place where the vaccine, in appropriate dose, is injected into the blood stream of a living animal or man. The result is a sudden increase in the bactericidal power of the blood, which is general in nature and effective for other species besides that of the organism used in making the injection. There is here, therefore, a reaction of a type quite different from those with which the serologist usually works. It is no question of a slow development of agglutinins, complement-fixing bodies, or the like, in response to a specific infection, but a rapid and immediate outpouring of bactericidal substances available for the destruction of a number of bacterial species. Wright holds that these substances are derived from the leucocytes, a source of origin for all humoral anti-substances invoked by Metchnikoff many years ago ; and it may be relevant to recall here the marked effects produced upon the leucocytes by injection of peptones and a variety of other substances, as well as the maximum degree of the same phenomenon which is seen in shock, associated with intravenous injections in anaphylaxis. This line of thought may link up these phenomena with the striking results claimed from time to time, especially during the war, for intravenous injections of eusol, alkalies, and other substances, in desperate cases of sepsis, and to suggest that these bodies produce their

beneficial results not by any direct action upon the bacteria, but by their action upon the leucocytes."

As a further contribution to this aspect of therapeutic progress it is interesting to note the views of Professor H. H. Dale, which he recently expressed as follows : ([16])

" I think that it is especially encouraging to note that though in the action of almost every remedy which has proved its value in the specific cure of infection there are features which cannot be interpreted by a strict application of Ehrlich's distribution hypothesis, the discrepancies begin to show a new congruity among themselves. Repeatedly we find phenomena which point to the need of modifying the theoretical structure in the same direction. The conception of a remedy not killing the parasites immediately, but modifying their virulence, or lowering their resistance to the body's natural defences ; of a remedy not acting as such, but in virtue of the formation from it in the body of some directly toxic product, either by a modification of its structure or by its union with some tissue constituent ; of an affinity of the remedy for certain cells of the host's body, leading to the formation of a dépôt from which, in long-persistent, never dangerous concentration, the curative substance is slowly released ; all these conceptions present themselves again and again as necessary for our present rationalisation of the effects observed. It can hardly be doubted that they will potently influence the methods by which, in the immediate future, new and still better specific remedies are sought."

The above-quoted considerations show that the time is ripe for a generalising, clarifying, and systematising conception, for a point of view which, while simple, embraces and explains all the facts. Such a conception would seem quite recently to have emerged. In a book entitled *The Nature of*

Disease,[17] J. E. R. McDonagh advances a theory which he defends in a most convincing manner. This conception, while new, and in a measure startling, is nevertheless merely a correlation of scattered admitted facts, so assembled as to constitute an intelligible and exceedingly plausible common denominator. To bring order into the chaos which now pervades the whole realm of immunity, vaccines, and sera referred to by the above-quoted authorities, McDonagh introduces the electron theory. The electron theory is itself comparatively new, but it compelled immediate general acceptance by the light which it introduced into hitherto impenetrable places. McDonagh begins by setting aside the corpuscular element in the blood in order to concentrate his attention upon the plasma. In the liquor sanguinis, as studied by the ultra-microscope, he found certain protein particles which he believes to be the real protectors of the organism against toxic invasion. The defensive power of these particles depends upon their electronic reactions.

Electricity, it is now admitted, consists of electric atoms of two kinds, the negative atoms, called electrons, and the positive atoms, called protons. The electrons supply the negative charge; protons supply the positive charge. Certain of the protein particles in the plasma are charged with electrons, and, to maintain the electric balance, certain others are charged with protons. In this balance the superiority is normally with the electrons. There is a chronic state of war between the two; the protons try to rob the electrons of their force, and *vice versa*, but the balance of power remains with the electrons.

If, now, into this condition of more or less

stable equilibrium we introduce another element, a bacterial toxin, which reinforces the protonic power, the electronic power will undergo defeat, which means disease, and if continued, it will mean death. The only thing which will counteract disease and prevent death is such a reinforcement of the electrons as will redress the balance and restore normality.

There are two substances in nature, metals and non-metals, which when introduced into the blood immediately reinforce either the electrons or the protons. Among these substances those which reinforce the electrons are called conductors ; those which reinforce the protons are called condensers. McDonagh says :

" A conductor is a body which gives up one or more of its atoms of electricity (electrons) to another body. A condenser is a body which deprives another body of one or more electrons. When a conductor meets the protein particles in the plasma it causes the atoms of the latter to break up. This results in the particles increasing in number, diminishing in size, and acquiring a greater negative charge. These changes are covered by the word ' dispersion.' When a condenser meets the protein particles it causes some of them to undergo lysis and others to increase in size, and to become agglutinated and to be precipitated. These changes are covered by the word ' condensation.' Bodies act as conductors and condensers only so long as they are in the colloid state."

The protein particles in the liquor sanguinis are in the colloid state. When the electrons in these particles are seriously diminished, the colloid state of the particles undergoes a change, the nature of the change depending for the most part upon the poisonous degree of the toxin. The

change may, for example, take the form either of dehydration or its opposite, undue hydration. Dehydration causes some of the protein particles to be broken up into very fine molecular division, and some to swell up and clump together. The former are thrown into solution ; whereby they exchange their colloid for a crystalloid state. Dehydration is the fundamental cause of the clinical symptoms of inflammation. Hydration, on the other hand, causes an increase in size of the protein particles with, maybe, in certain instances their precipitation. The former, according to McDonagh, is the morbid process underlying the evolution of cancer ; because hydration leads to isolation, and the metabolic processes are conducted independently of those in the cells around. When the protein particles are precipitated the blood leaves the peripheral vessels, and the protein particles are collected in the lymphatics and capillaries of the lungs, brain, or liver, giving rise to the condition of shock. Senility is the result of long-continued dehydration. There is a close analogy between senility and the ageing of rubber, just as there is between hydration and the vulcanisation of rubber.

The way in which remedies act is called dispersion. Metallic substances are the best conductors when the condition is acute, and non-metallic substances when the condition is chronic. Both act by conducting electricity to the debilitated protein particles, thus causing them to increase in number and electronic power. The equilibrium is thus re-established, and the invader is annihilated.

Such, in very brief outline, is the gist of McDonagh's teaching. I have tried to divest it of technicalities in order to emphasise its essen-

tial simplicity. Its practical outcome amounts to this : disease is due to the successful attempt on the part of a toxin to rob the protein particles of their electrons. It follows that any measure which will restore the electrons soon enough and in a sufficient degree, will bring about a *restitutio ad integrum*. There are therefore no longer any diseases : there is one disease which has as many manifestations as there are toxins capable of robbing electrons. The degree and nature of the reaction of the protein particles determine the clinical features. There are thus no longer a host of morbid incomprehensibles, but one many-faceted morbid state which is quite comprehensible. It is not to be expected that this remarkably fine piece of constructive work should at this stage be either complete or correct in all its details. If, however, the foundations are well and truly laid, as I believe them to be, the superstructure will erect itself. McDonagh's book is unfortunately rather overlaid with technicalities for rapid comprehension by those who are not bio-chemists, but it fully deserves most careful study. He has not only formulated a clarifying theory, but he brings evidence to show that it works out correctly in practice. If his claims are substantiated, his work will have revolutionised our ideas on such microbic diseases as pneumonia and such metabolic disorders as diabetes—to mention two only among many.

McDonagh's views as to the paramount importance to health of a proper electrical balance in the organs may eventually serve to cast some much-needed light on the vexed questions surrounding what is known as the electrotonic reactions of Abrams. Whatever there may be of truth in the claims put forward on behalf of the E.R.A., as

it is called—and to the unbiased observer there appears to be some truth—it is at present so successfully concealed and camouflaged by fallacies and falsities, so obvious as to merit the term impertinent, that any intending investigator is apt to find the door of reasonable scientific inquiry suddenly slammed in his face. While it is quite impossible to doubt the results claimed for these methods by the very reputable and even distinguished physicians who have employed them, there is so far a complete absence of anything approaching to a scientific explanation of their *modus operandi*. I hazard the suggestion that McDonagh's work may eventually bring some intelligible order into what is at present an almost grotesque chaos.

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CHAPTER VI

FALLING GROUND

However strong and healthy a man may be, and however carefully he may have husbanded his strength, the time comes when he is reluctantly obliged to recognise that he is physically on falling ground. I say "physically," because I do not believe that there is necessarily any decline in mental capacity as the years advance. There ought, on the contrary, to be a steady gain, for, as the French have it, in the case of the man who grows old physiologically and normally, "le cerveau psychique est l'ultimum senescens." It is certainly true that there have been numerous great men who, though obviously senescent physically, have yet managed not only to retain, but actually to improve, the quality of their brain-work up to very advanced ages. It seems that man grows old "in bits," and that the portions of him which last longest are those which have been most fully employed. It is as though the demand for an increased amount of energy by certain organs or systems, created the necessary supply. A man's brain may thus continue active at the expense, so to speak, of his muscles, joints, and other tissues; what remains of vigour in the decrescent circulatory system being concentrated, as it were, upon the organ which claims it most insistently. A further explanation of the retention of mental vigour long after the bodily is in a state of manifest

decline, is suggested by the consideration that, inasmuch as it is the organ which is developed last, the brain may, other things being equal, be expected to retain its efficiency for a longer period than those organs which were developed earlier; or, to put it more accurately, those organs which arrive soonest at complete functional maturity are liable to decline before the organs which ripen tardily.

Still regarding the matter from the point of view of a purely physiological involution — an involution, that is, which is not seriously influenced by major toxæmias—we should expect the purely animal side of man, especially his somatic tissues, to show signs of wear long before his brain and central nervous system begin to deteriorate. And that is precisely what we do find; but we find in addition, what seems to be a special adaptation by which certain organs seem willing to forgo their share of the communal energy in order that the cerebral activities may suffer no shortage. The arteries, for example, have attained their full development at the moment of birth, and in normal involution they are among the first to show signs of wear; blood is nevertheless delivered to the brain in full measure long after the supply to the muscles and joints has been severely rationed. When brain troubles manifest themselves at this stage of life, they are due primarily not to any defect in the quantity of the arterial supply, but to the quality of the substance supplied. So long as the blood stream can be maintained in a state of reasonable purity, the functions of the brain remain unimpaired. The degeneration in the cerebral vessels themselves is a later event and is due, as we have already seen, to the poisons in

the blood acting either on the walls of the conduits, or otherwise.

It is not suggested that the cerebral activities remain uninfluenced by the general dying down of the bodily functions as a whole. On the contrary, these activities are changed, but the change is one of kind rather than one of degree. By the time that man finds himself definitely on falling ground he has shed his illusions, though he may retain his ideals; the passions and emotions of life have lost their intensity; and their counterfeit presentment, as in poems and love tales, have ceased to awaken interest; the subtle and mysterious magnet of the society of the opposite sex ceases to attract. In spite of all this, however, his intellect remains. "Age," says Bacon, "doth profit rather in the powers of Understanding than in the virtues of the Will and Affections."

In order to justify this relative monopoly of the blood supply by the brain, a man must continue to use it. He must not allow his faculties to rust. He must keep on working. It is a common experience that the man who retires from business and is devoid of compelling hobbies or interests, soon dies. This is altogether opposed to the theory, at one time in vogue, that the full use of an organ brought about its fatigue and early degeneration. As some one has very properly pointed out, postmen seldom suffer from degenerated lower limbs, nor do brain workers die of meningitis. It is, of course, true that people who have abused their organs are liable to suffer the penalties in those organs, but no one has ever so overworked his brain as to cause its premature decline. He may abuse his cerebral capacities by associating them overmuch with his emotions, but definite cerebral

work on a plane remote from the emotions and free from other causes which tend to overstimulate it, is very difficult to overdrive. A man can force himself to go on working up to a certain point. But the certain point once reached, work becomes impossible—work, at any rate, which is of any real value. When a man has overdriven himself with thinking, he finds that the quality of the result suffers, to the point, in many cases, of its having to be done over again.

This necessity for a full supply of blood to the brain connotes a diminished supply to most of the other organs. In the case of the muscles, bones, and joints, this is obvious. In the case of the digestive organs, it is less obvious, but still abundantly true. A diminished blood supply to the organs of digestion is a necessary corollary of diminished blood supply to the muscles and joints, otherwise it would be impossible to retain the balance. With the atrophy of the muscles comes a diminished capacity on their part to metabolise the products of digestion; so that the supply of nutritive material sent to them by the digestive organs must be restricted. It therefore follows that the amount of this nutritive material admitted to the digestive organs ought to suffer a similar restriction. Here, again, we find that modern teaching is quite opposed to the beliefs and theories of our forefathers. It is not so very long since it was held that inasmuch as old people were feeble, it was necessary to support them by means of a generous intake, in the hope presumably that an excess of food would act as a sort of internal splint to keep the tottering frame together. This homicidal principle is fortunately less in favour than it used to be, but its limited survival still does

an enormous amount of harm. The necessity for moderation in diet, which is urgent at all ages, becomes a solemn duty as man grows older, and increasingly solemn as he finds himself on falling ground. The only activity which he can hope to retain in full measure is his cerebral activity, and it is a matter of common knowledge that the activity of the brain is in inverse ratio to the activity of the stomach.

It is said that as he travels downhill a man becomes edentulous in order that he shall be prevented, physically and mechanically, from eating the foods which he was justified in consuming during his prime. The real explanation, however, would seem to be that he sheds his teeth not because he ate an excessive quantity of food in his prime, but because those foods were over-stimulating and in other ways unsuitable. It is a question much more of quality than of quantity. Although quantity may contribute to the downfall of a man's denture, the real cause is to be sought in the meats and sugars which have strewn the primrose paths of his maturity. There is no reason why a person, even of extreme age, should not retain the denture which Nature conferred upon him, if, during his lifetime, he has not allowed himself to be beguiled by attractive toxins. Sir Isaac Newton, for example, at the age of 85 had lost but one tooth only, and most of us could quote instances of a similar kind.

One of the many penalties attaching to the period of falling ground is the incidence of presbyopia. This is defined as follows by Ernest Clarke : (1)

" In early youth the crystalline lens is practically a small bag of semifluid jelly, and accommodation takes place by its being squeezed by the

action of the ciliary muscle in such a manner that its antero-posterior diameter is enlarged. So great is this squeezability (if I may use the term) in the very young, that an accommodative power of twenty diopters can often be recorded. As age advances, the ordinary process of sclerosis goes on in the lens, as in all the other tissues of the body, so its squeezability becomes less and less until a point is reached where the near point of accommodation, which represents the fullest accommodative power, has so far receded that the normal eye requires assistance in the shape of a convex lens in order to see more objects distinctly. This is presbyopia."

The presbyopic period shows itself as a rule between 45 and 50. That is true for the majority of brain workers, at any rate, but people vary enormously in this respect. A great many cases have been recorded of persons over 70, who were able to accommodate as well as they could when they were 20 years of age.

When the ordinary educated person reaches 50 (sometimes it is as early as 40), he finds that he is no longer able to do near work for any length of time without fatigue. The work is automatically and instinctively placed farther and farther away from the eyes, so as to spare the effort of accommodation as much as possible. As a patient once put it to me, "I cannot read the paper; there does not seem to be anything the matter with my eyes, but my arms are not long enough." This fatigue is seldom referred to the eye itself, but, like ordinary muscular fatigue, it expresses itself as a general disinclination to continue the work in hand. Sustained effort of accommodation not infrequently takes the form of an overpowering somnolence. Headache is quite a common result

of forcing the eyes to do work for which they are no longer adapted; or there may be troublesome lachrymation, and the edges of the eyelids tend to become red and chronically inflamed. Ordinary fatigue of the accommodation, even in comparatively young people, may demand the assistance of glasses for near work, as in the case of those who read much by artificial light. This is especially the case when the artificial light is badly placed, and not, as it should be, behind the head with the reflection on to the work and away from the eye itself.

People will sometimes complain that their eyesight varies considerably. The reason of this is that the ciliary muscle, like every other muscle in the body, is largely dependent on the general state of fitness in the individual. When the general health is at its best, the eyesight is at its best. It has frequently been my lot to succeed with a blue pill and Seidlitz powder, in relieving ocular symptoms for which the specialist had been unable to account. Ernest Clarke (2) insists that chronic intestinal stasis hastens very definitely the onset of the presbyopic period.

When people take to glasses for near work, it is well to direct the optician to supply bifocal lenses. Bifocals may seem somewhat troublesome at first, but in these days of "flat" bifocals, a person very soon becomes accustomed to the difference in the upper and lower zones, and the combination saves him the trouble of constantly taking off, and putting on, his glasses when he wants to look away from, or at, his work. Simple presbyopia seldom gives rise to the protean symptoms of eyestrain; it is only when astigmatism is associated with the hardening lens that trouble comes.

In the matter of eyestrain due to astigmatism, especially to low degrees of astigmatism, it is easy to realise that as the lens becomes less "squeezable" at the same time as the ciliary muscle begins to lose its power, symptoms are liable to arise. The strain is cast upon the eyes by an endeavour to contract the muscle irregularly, so that the blur of astigmatism shall give place to clear definition. This strain will increase as the person grows older, his ciliary muscle stiffer, and his lens less squeezable. When presbyopia comes, it is therefore very desirable that the eyes should be carefully refracted so that not only the presbyopia itself, but any accompanying astigmatism, however small in degree, may be detected and corrected. Some oculists decline to correct minor errors of astigmatism, not from laziness, but because they deem it unnecessary. This is an attitude which, from the point of view of the physician, it would be difficult to condemn too strongly.

Some writers declare that presbyopia brings with it a certain measure of colour blindness, and assert that this is the reason for what the French call "la manière sénile des peintres." This *manière sénile* is, however, much more frequently due to astigmatism than to colour blindness. The elderly painters' dots become commas. This was conspicuously the case in the great Turner's later work. For those who travel much there is one very conspicuous countervailing advantage in presbyopia: sea-sickness in normal people is an ocular phenomenon which diminishes and ultimately passes away as presbyopia increases.

The so-called arcus senilis is a misnomer, for two reasons. It is by no means an invariable

accompaniment of senility, nor does it appear only in the senile. It is quite common in people who are still young. I have seen it in students, and Nascher, the author of *Geriatrics*, says that he himself had already acquired an arcus senilis by the time he was a schoolboy. A good many of the cases of premature "arcus" are due to uncorrected errors of astigmatism. The essential character of the arcus is an infiltration with fats, and degeneration of elastic tissue at the periphery of the cornea. It does not seem to have any pathological significance, but when detected in a young person it should lead to careful refraction under a mydriatic.

It is often said that "trying" the eyes by reading in the train and reading in a subdued light is to be avoided. Sir Hermann Weber (3) insists upon this point of view, and says that we can prolong the maintenance of the functions of the eye by the avoidance of such strains, and thus postpone one of the greatest inconveniences of old age. Commenting upon this, in the Preface of the same book, Sir Clifford Allbutt deprecates such warnings. He says: "When carriage lighting was far less effective than it is now, I occupied all my travelling hours in reading and correspondence, and scarcely know how my work could otherwise have been done. I still continue this practice, and use has kept my eyesight active and clear." There is perhaps much to be said for both points of view. The comment which I would venture upon Sir Clifford Allbutt's experience is that the learned Professor must have been endowed with very good eyesight to begin with; that, in fact, he must originally have been perfectly emmetropic. If he had suffered as some of us have

suffered, up to middle age, with a slight uncorrected error of astigmatism, there can, I think, be little doubt that his travelling experiences would have done his eyesight harm. I am nevertheless in full agreement with the implication that you should work your eyesight, just as you should work every other part of your body.

It comes, in reality, to this, that in common with the other organs, the eye when perfectly normal is not easily overstrained, but that when it is the subject of some uncorrected visual error, a degree of work which is harmless to the normal eye becomes a real penance, not only to the abnormal eye itself, but to the nervous system of its unfortunate possessor. Eyestrains of all kinds and degrees are capable of imposing many miseries of various kinds and degrees upon all sorts of people. A really skilful refractionist can be a veritable saviour in such circumstances by lifting and clarifying a patient's whole outlook on life.

Though easy to forget, it is necessary to remember that, as G. W. Dawson (4) points out, ocular troubles may originate in the nose and its accessory sinuses. Having regard to the constant exposure of these sinuses to infection and to the stealthy manner in which an "antrum" may develop, one must not lose sight of the fact that the orbit in the *genus homo* has encroached upon the original nasal area to such an extent that the eye is surrounded by nasal and paranasal structures. Dimness of vision, conjunctival congestion, enlargement of the caruncle, œdema of the lids, corneal ulcers, iritis, lachrymal affections, and even optic neuritis, may be, and are, more frequently than is generally supposed, directly due to lesions in the nasal area.

A curious association has been noticed by Mr. William Stobie (5) between blue sclerotics, brittle bones, and progressive deafness. He investigated a family of sixty-six persons belonging to five generations, among whom were eighteen who displayed blue sclerotics. Of these, eight suffered from fractures and deafness. Nothing is as yet known about this diathesis, if diathesis it be. Blue sclerotics in children used to be looked upon as a sign of delicacy.

At the presbyopic period of life it is usual for the hearing to lose its acuity; the degenerative processes in the two organs seem to run side by side, so that after 60 years of age there are very few people with emmetropic eyes or normal hearing. According to Albert Gray (6) there is developed a characteristic form of deafness with the higher notes of Galton's whistle, in all elderly people, even when for all practical purposes there is no obvious defect in hearing nor any tinnitus. This is considered by Gray to be due to progressive atrophy of the ligamentum spirale.

Chronic progressive labyrinthine deafness, which is due to an atrophy of the auditory nerve, is the most common cause of impaired hearing at this period of life. Other causes are fixation of the stapes, gouty eczema of the external auditory meatus, and collections of wax. It is also undoubtedly true that deafness may be more apparent than real, in the sense that a large number of people who are not yet senile are accounted deaf merely because they are inattentive. When anything which really interests them is afoot, such people are able to hear as well as anybody else. Tinnitus aurium, ringing or singing in the ears, is a very common accompaniment of deafness, though

it may, and often does, arise independently of any defect in hearing. Subjective sounds of various kinds are constantly heard by elderly people, and give rise to a great deal of annoyance. When the noises are intermittent the prognosis is better than when they are continuous. An examination of the ear in order to remove wax or foreign bodies in the meatus seems an obvious expedient; it is unfortunately very often neglected. It seems necessary to utter a word of warning against treating tinnitus associated with labyrinthine deafness, by vibrations, electrical or otherwise, or massage of the ear, which is sometimes advised by the inexperienced. Such treatment never does any good, and may do a great deal of harm.

Tinnitus is very often associated with vertigo. This is not surprising when we remember that the sense of equilibrium resides partly in the semicircular canals, which have a very important part to play in the co-ordination of voluntary movements. The symptomatic treatment of tinnitus resolves itself into the exhibition of hydrobromic acid. This may be prescribed in doses of 1 drachm with syrup of orange, three times daily. Much larger doses, *e.g.* 4 drachms, should be tried before admitting failure.

Vertigo or giddiness may own causes other than aural disease. It is one of the symptoms of cerebellar tumour, and is not altogether uncommon in tabes and other derangements of the cerebrospinal system. It may also be due to ocular troubles, among which undetected and therefore uncorrected errors of refraction are depressingly common. A transient giddiness on rising from the recumbent to the upright posture is by no means rare in elderly men, especially when they

are not at their best. The adaptability of the blood pressure seems in some way at fault. This type of giddiness, transient though it be, very often gives rise to considerable alarm, and it is well to be able to reassure the patient that it has no serious significance. More often than not a purgative will cause its disappearance. Giddiness which is not in any way associated either with tinnitus or with impairment of hearing, or any of the above-mentioned causes, should be regarded as due to a default in the circulatory system. The disturbance usually takes the form of a vaso-constriction, but a vaso-dilation may cause the same symptom. It is said that the giddiness of elderly people usually means atheroma, that of the gouty, arterio-sclerosis; but inasmuch as elderly people are frequently gouty, and gouty people usually elderly, it is difficult to see how this distinction is arrived at. It is quite possible that the symptom is due to a purely functional fault on the part of the blood vessels in the brain, the circulatory apparatus of which is of so delicate a nature that any alteration in the calibre of the vessels, which is not promptly compensated for in the usual way, is liable to give rise to this symptom. Ménière's disease, also called aural vertigo, is due to a definite affection of the semicircular canals, and may cause paroxysmal attacks of giddiness accompanied by vomiting. The giddiness in these cases is very pronounced, so much so, indeed, that the patient not infrequently falls. When the deafness with which it is accompanied becomes complete, these attacks usually cease.

As man progresses down the hill he shows, sooner or later, definite evidence of his age in the skin and its appendages. The integument tends

to become dry, thin, and smooth, and, owing to the disappearance of the elastic tissue and muscular fibre, wrinkles invariably show themselves. These changes mean that the capillaries diminish both in size and number; they atrophy from disuse, and the nutrition of the integument becomes seriously impaired. This is customarily followed by pallor, but there is not infrequently pigmentation, which may be either uniform or patchy in its distribution. One writer, Pringle, holds that the pigmentation is to be regarded as a means of protection. In his view, there is a relationship between pigmentation and malignant disease, the latter being liable to occur when pigmentation fails to make its appearance.

That pigmentation is a protective measure, especially against certain rays of the spectrum, there can now be no reasonable doubt, and the failure to produce pigment represents a serious physiological fault on the part of the individual. In these climates, the consequences of this failure are not serious, but in tropical and subtropical climates it may lead to very disastrous consequences. As I have already pointed out, the reason for the failure is probably to be found in the adrenal or the pituitary, certainly in some member or members of the endocrine system.

Freckling is an abortive attempt to produce tanning, and those who, on exposure, are unable to develop a sufficiency of tan, usually seek to redress the balance by an abnormal growth of hair. The pigment in the skin of the *genus homo* serves the same protective purpose as the hair on the anthropoid ape. People who are unable to produce either pigment or superabundant hair should not be sent to those parts of the tropics where the aborigines are black. The white woman, especially

the fair white woman, tends to lose her reproductive capacity in a coloured man's country. A capacity to produce pigment of the same kind and in the same degree as the aborigines is a condition precedent of the successful colonisation of any particular region.

The hair of the head and beard commonly grows grey, and then white, as the years advance. This is by no means a rule without exceptions, for it is well known that some very old people, even centenarians, have somehow managed to retain the natural colour of the hair. On the other hand, people who are comparatively young have silver white hair. Ernest Clarke holds that prematurely greying hair is a sign of eyestrain ; others contend that the phenomenon, especially when it is rapid and occurs about middle life, is very suspicious of the onset of malignant disease. On this matter, Sir Humphry Rolleston quotes the Sage of Norwich as saying, " Hairs make fallible Predictions, and many Temples early Gray have outlived the Psalmist's Period," and Lord Bacon as writing, " Hasty gray hairs without baldness is a token of long time ; contrarily, if they be accompanied by baldness." The baldness, however, is commonly due simply to a want of stimulation of the hair follicles. Our grandfathers, who wore their hair long, did not grow bald to anything like the same extent as is common to our generation. To keep it clean and in its place, short hair, in comparison with long, requires very little brushing and combing. The convenience of this is counterbalanced by the fact that in the absence of the stimulus supplied by these attentions, the hair follicles atrophy and baldness results. Women, whose long hair obliges them to use the brush and comb vigorously, seldom

grow bald at middle age, the pull of the long hair ensuring that the roots shall be kept in good order. Baldness may, of course, be due to thyroidal and other endocrine deficiencies.

One of the penalties of advancing years in apparently healthy people of a certain constitution is the development of eczema. It is usually called gouty eczema, and may be either of the dry or the moist variety. The two situations which it seems most to favour are the external auditory meatus and the anus, but it is by no means confined to these situations. When it attacks the external auditory meatus it usually occurs on both sides simultaneously. The narrowing of the meatus caused by this troublesome affection is often so great as to render it impossible to obtain a view of the ear-drum. For some curious reason an eczema in this area is refractory to, and intolerant of, ointments, but powders are generally very well borne. Eczema ani is often limited in its extent, though it may extend to the neighbouring parts. The irritation seems to be increased at night, and the part is therefore liable to be scratched during sleep. The cause of this condition is almost always some form of gastro-intestinal derangement, which in the large majority of cases is accompanied by constipation. It is very often directly caused by hæmorrhoids. It may also indicate the presence of a carcinoma in the rectum. In all cases the cause must be carefully searched for. Palliative treatment will certainly not succeed unless the underlying cause, if there be one, is removed. In merely transient derangement due to gastro-intestinal troubles, I find the ointment called resinol to be very efficacious. Soap seems to have a very irritating effect on an eczema situated in

this area. If therefore it is deemed advisable to prescribe the use of enemata—and it often is—care should be taken to exclude soap from the fluid. An ointment containing carbolic acid sometimes acts very well. A temptation which should be resisted as long as possible is to prescribe cocaine.

There are two very simple precautions which when observed may give very decided relief in these cases. The first refers to the hot bottle which is nowadays very properly placed in the beds of many elderly people. The servant usually deposits this in the middle of the bed, with the result that the place where the buttock rests is hot when the patient retires. This local heat frequently causes irritation and scratching. The bottle should therefore be placed at the foot of the bed, where it cannot occasion this undesirable local hyperæmia. The second refers to a general cutaneous hyperæmia which is not easy to regulate. If the covering is too light, the patient cannot sleep; if it is too heavy, he wakes overheated during the night and may be unable to go to sleep again. In cases which present this thermic sensitiveness I have found Marcus Paterson's slumber-mats [1] very efficacious. Their author originally introduced them to prevent night sweats, but they have proved themselves to be useful in many conditions outside phthisis.

Short of the irritation produced by eczema, the skin of elderly people is liable to become irritable and they suffer from a generalised itching of the trunk and extremities. This is presumably due to the cause already noticed, namely, an atrophy of the capillaries and consequent starving of the

[1] Made by Messrs. Mayer & Phelps, 59 New Cavendish Street, London, W.1.

nerves of the integument. The only way of dealing with this troublesome condition is to try and restore the circulation in the skin to something like its original condition by baths, massage, electricity, and heliotherapy.

Psoriasis, though not conspicuously an affection of middle life, is very apt to occur in later years. This eruption is the despair of the dermatologist: no one knows its ætiology; and treatment, however promising at first, is liable to prove disappointing in the long run. I can record one case which, having resisted all measures directed to its cure at the hands of very skilful and resourceful dermatologists, yielded rapidly, and so far permanently, to the injections of sea-water, as advocated by Quinton.(7)

The skin of elderly people is liable to be beset by warts. The particular variety which affects them is the *Verruca plana*, which is sometimes called the *Verruca senilis*. It occupies a much larger area than the ordinary common wart; it is usually pigmented, and must be regarded as much more serious than the common wart, inasmuch as it may be the starting-point of an epithelioma. These warts may be very numerous, especially on the back and the nape of the neck. When they attack the face it is usually in the neighbourhood of the ears, but by no means always. Oliver Cromwell's wart was, presumably, of this nature. The *Verruca senilis* should not be treated by acetic acid or salicylic acid, or any of the destructive measures which are properly applied to the simpler variety. It is safer to leave them altogether alone. I can recall a case of rodent ulcer which was confidently attributed to the destruction of such a wart by nitric acid.

Perhaps the commonest affection of the skin in middle age is furunculosis. Boils may attack any part of the body except the palms of the hands and soles of the feet, but they have a special tendency to attack the back of the neck, the axillæ, the hips, and the meatuses. The cause of these troublesome eruptions is often very difficult to ascertain in an individual case, but it is generally to be found in some fault of metabolism. Boils are often a manifestation of gout; more often they mean chronic intestinal stasis. Whenever a boil makes its appearance about middle age, the urine should be tested for sugar. If the test is negative, the blood sugar should be estimated. A more serious manifestation of what may be presumed to be the same cause is a carbuncle. A carbuncle has been described as an aggregation of boils. It may sometimes assume enormous proportions, and it is very painful and enfeebling. In both cases, boils and carbuncles, vaccines have been found to be very useful. When they fail, injections of collosol manganese or emetine chloride should be tried. The best local treatment I have found to be a paint made of a combination of ichthyol and glycerine.

One of the most frequent troubles of the stage of life which we are now considering is roughly grouped under the term "**Rheumatics.**" A Blue Book, recently published under the auspices of the Ministry of Health, on the incidence of rheumatic diseases generally, tells us that nearly one-sixth of the industrial invalidity in this country is due to this cause, and that these illnesses each year cost the Approved Societies nearly £2,000,000 of money in sick benefit alone. The only thing that one can positively assert with regard to rheu-

matic diseases seems to be that there is no possibility of distinguishing between them clinically. F. J. Poynton ([8]) who has done a great deal to bring order into the chaos which surrounded the subject before his time, says that fibrositis and panniculitis (that is, fibrositis attacking specially the areolar subcuticular tissues) account for nearly half of the invalidism of the insured due to the so-called rheumatic diseases.

" Nomenclature," he says despairingly, " is apt to lead us astray, for if we look upon these conditions as entities, we are sure to get confused ; they are the result of many differing causes and present many differing pictures. We all know lumbago and stiff neck, and can recall with equal facility the child with acute rheumatism and a stiff neck, the adult who after lumbago and sciatica develops osteo-arthritis, and the man in the intervals of acute gout who has continual attacks of fibrositis."

In the same interesting paper Poynton has the following paragraph, the suggestion contained in which has the great merit of introducing a scientific basis for an improved attitude towards these baffling rheumatic troubles :

" In dealing with rheumatic diseases there is one useful conception which may possibly not have occurred to every one. The conception of a human body with all noble tissues, the brain, muscles, liver, spleen, and so on, removed by some solvent and replaced by an inert substance, but with all the connective tissues preserved intact. We can then realise the importance of this framework. In it lie the minute blood vessels, lymphatics and nerves, and the connective tissue cells. When we visualise this tissue attaching the skin to subjacent structures, and ensheathing the muscles and

nerves, and permeating everywhere, we cannot fail to see how many factors may influence the history of rheumatics—factors such as movement, temperature and humidity, injury, metabolism, etc. When an infective agent gains access to the blood stream, it is deposited first in these tissues, escaping from the minute blood capillaries into the perivascular connective tissue."

From this picture we are able to glean some reason for the protean manifestations of what appears fundamentally to be the same morbid process.

Perhaps the most common of these manifestations is that which is known as sciatica, in connection with which a word of warning is necessary. So common is a " rheumatic " pain in the distribution of this great nerve that the public are apt to make light of it, and a busy practitioner may be excused for accepting the ready-made diagnosis. He should, however, learn to be cautious in so doing, especially if the pain is definitely worse at night, or if both the sciatic nerves are involved. In such cases it is tolerably certain that a mere fibrositis will not explain the whole story, so that before admitting the more facile diagnosis it is necessary to examine the pelvic viscera for tumours and displacements and to be quite certain that the pain does not emanate from a tumour or other lesion in the neighbourhood of the vertebral column. I remember a case of a one-sided sciatica which had persisted for months in spite of every kind of treatment, but completely disappeared after a bad attack of renal colic on the affected side. It is instructive to note that the pain in this case was frequently worse at night. Such a case teaches us the desirability of a more than usually careful

urinary examination whenever the cause of a sciatica is obscure.

About two years ago, an officer in the Indian Medical Service presented himself for examination for life assurance. One of the items on the questionnaire is " Have you ever suffered from rheumatism ? " To this he replied that he had an arthritis in the right knee, subacute at first, and then chronic, extending over a period of about two years. In the search which was undertaken by his colleagues for an explanation of this condition, he had been subjected to every form of clinical and laboratory investigation. He had been examined for the spirochæte and the gonococcus, he had been sigmoidoscoped and X-rayed from head to foot. He had an excellent set of teeth with which the radiographers, and there were several, could find no fault. One day, however, he developed a pain in a lower molar on the same side as his arthritic knee. The pain persisted, and the lower molar was removed. The tooth was not decayed, and there seemed to be no reason why it should have caused any pain. From the day that this tooth was extracted, his arthritis began to improve, and eventually completely disappeared. There were no traces of it when I examined him. And it had been severe enough to enlarge the joint and cripple him.

To the falling ground stage of man's life belongs what Sir Clifford Allbutt ([9]) calls " one of the fiercest and most searching inflictions which can fall upon steadfast and resolute men," namely, **Angina Pectoris.** Sir Richard Douglas Powell writes of it as follows : " Angina in its graver forms is an appalling and picturesque disease, about which a certain glamour has been cast by the many noble

and distinguished lives it has stricken down." With regard to the age incidence, Sir Clifford Allbutt says : " Angina is by no means unknown in the aged and decayed, but its greater prevalence is at a somewhat earlier stage, in the years of senescence ; in senectus not in senium." In another place the same authority says : " I must content myself here with repeating that angina pectoris after middle life is usually atheromatous ; under the age of 45, if not the mock disease, it is usually either syphilis, rheumatic fever, or influenza." The discussion of true angina is outside the scope of this work, but we may profitably consider some of the varieties of the " mock " disease to which the distinguished Professor refers, if only to prevent unnecesary alarm and to enable the physician to reassure the patient. Sir Clifford Allbutt pours much well-deserved scorn upon those who would see in what Sir William Gowers aptly called vaso-vagal storms any association with real angina pectoris. " Not long ago," he says, " a lady had one of her ' attacks ' in my consulting-room. As I was feeling her radial pulse, the artery, as Morgagni remarked, rather suddenly shrank to a thread, and then ceased to be perceptible. Tension rose high in the blood vessels ; the breast and heart became oppressed and the respiration panting ; but there was no pain. Such attacks often depend upon urogenital, abdominal, or other visceral lesions or dislocations, or even on carious teeth." With all due respect, I would add that they are generally due to endocrine disorders.

On the other hand, he warns us against mistakes in the opposite direction, that, namely, of the " grave and possibly calamitous error of mistaking angina pectoris for a nervous squall," and quotes

among other examples the following from a lecture by Sir James Goodhart :

" Male, aged 60, consulted a physician in town, who said he was suffering from pseudo angina. At a later date he saw another well-known physician who also, I suspect from motives of humanity, called it a false angina, but the case proved then and afterwards to be only too genuine."

But vaso-vagal storms are by no means the only conditions which may give rise to symptoms sufficiently suggestive of true angina. I have elsewhere dealt with this matter in connection with sthenic dyspepsia,([10]) and make no apology for repeating what I then wrote :

" There is a condition which some, at any rate, of the manifestations of sthenic dyspepsia are liable very closely to simulate, and to which it therefore seems desirable briefly to refer, namely, angina pectoris. Where sthenic dyspepsia is associated, as it not infrequently is, with some degree of gastric dilatation, symptoms resembling true angina are by no means uncommon. I have already referred to the fact that attacks of sneezing, dyspnœa, and the like, are in these cases very liable to occur in the early hours of the morning, and I have pointed out that these attacks are due to the irritation produced primarily by the excess of acid present at the end of digestion.

" Now, it is not difficult to understand how the constant flatulent distension of a somewhat dilated stomach will cause serious mechanical embarrassment to the heart, nor that, as a result, symptoms should ensue which are very suggestive of true angina. Add to this the fact that the patient frequently brings a history of pain in the chest, evoked by exertion, which radiates down the arms, and the suspicion of angina is necessarily deepened.

It is important to remember, therefore, that all these symptoms are entirely compatible with functional gastric disturbance; and to prevent unnecessary alarm to the patient and his friends, it is well to avoid all mention of the more serious condition until the less serious can be excluded.

"There are some facts which may aid us in arriving at a conclusion upon this point, which is liable to present difficulties not only because of the general resemblance between the symptoms, but also because an attack of flatulence may be the starting-point of the first of a series of true anginal seizures. In the first place, then, it may be said, that the constant pressure of palpitation in association with the attacks is against the suspicion of angina and in favour of simple dyspepsia. In favour of dyspepsia, also, is the regular occurrence of the attacks in the early hours of the morning. When inquiry elicits that the pain on exertion occurs always after a meal and never when the stomach is empty, the fear of angina may be allowed to recede, and it may be dismissed altogether if an antacid taken at a suitable interval after meals is successful in preventing the attacks.

"The occurrence of such symptoms, however, even when they are quite definitely dyspeptic in origin, should not be too lightly regarded. They are often associated with giddiness and other phenomena which occasion alarm to patients, and if the cardio-vascular condition be carefully examined, as it should always be, it is very seldom found to be in an entirely satisfactory condition. Setting aside the heart itself, whose state, when it is affected at all, is variable, and is always secondary to the changes which are present in the arterioles and capillaries, it is necessary to examine carefully into the state of the arteries. These will generally—one may say always—be found in a state of high tension, and the treatment of the dyspepsia by means of antacids will be only

temporarily successful unless means be adopted to ensure that the intravascular pressure be permanently reduced. In order to reduce this pressure it is necessary to realise the nature of its cause. In nine cases out of ten this is the presence of toxins circulating in the blood. The toxins, by irritating the vessel walls, cause constriction of the muscular coats, and blood pressure is at once increased. The real nature of the toxins which may give rise to this state of matters is not yet understood; but in the cases under consideration—those, namely, of sthenic dyspepsia—they are generally, if not invariably, the result of excessive meat-eating."

Tobacco poisoning is another condition which simulates true angina. Professor Clifford Allbutt tells the story of one case as follows :

" The patient, a strong man of middle life, but presenting some signs of arterio-sclerosis, had an attack in my presence ; he writhed in a passion of distress ; by his wrestling with the invisible foe the sofa on which he was lying was partly overturned, so that from the back of it he rolled on to the floor. It was difficult to get him to say exactly, even after the attack, where the pain was, or if it were pain or some other distress which made him frantic ; but it seemed certainly to be a thoracic and apparently cardiac oppression, and taken alone reminded me of the agony of a clot in the heart. There was no more dyspnœa than the muscular effort would naturally produce. There was physical alarm, but perhaps not a peculiar angor animi. The well-marked premature systoles, the palpitation, the agitation, and the audible characters of the heart suggested tobacco, so that I took upon me, too confidently perhaps, to reassure the patient, who had some knowledge of medicine, that his fears of angina pectoris were unfounded. He was a very persistent smoker of

strong cigars, and on the restriction of this habit the symptoms abated."

In the same chapter Dr. Mitchell Bruce is quoted as giving the case of a man, also aged 60, who " had a fearful pain in the chest and down the left arm, cold sweats, and a sense that his last hour had come, and yet, on dropping his tobacco, he recovered."

In the presence of such alarming seizures it may be possible for such accurate and experienced clinicians as Sir Clifford Allbutt and Dr. Mitchell Bruce to be confident that they are not due to real angina, but some of us who are less experienced might well be pardoned for entertaining some doubt as to their real nature. Clinical instinct tells us a great deal about the difference between real suffering and simulated, but to distinguish between a real angina and an obviously painful counterfeit, demands more experience of seizures in general than most of us possess. Of the baneful effects of tobacco smoking I have seen something, but they have never amounted to a seizure. These effects are produced, I believe, not so much by the quantity of the tobacco, as by its quality. Very strong tobacco, even when smoked in relative moderation, is far more likely to give rise to trouble than a much larger quantity of a lighter kind. Another point in connection with what the French call " tabagisme " is that it is far more likely to appear in the case of one who smokes indoors than in one who spends most of his time in the open air.

The association between angina pectoris and gout appears to be a very close one. Sir Clifford Allbutt says : " Our gluttonous and bibulous ancestors, to judge by the records of their phy-

sicians, seem to have been subject to terrible conflicts which were lumped indiscriminately together under the conjectural titles of gout at the heart, at the stomach, or at the diaphragm. Some of these cases seem to have been angina, others the dyspnœa of pyæmia or hyperpiesis, others turbulent cardiac arrhythmia, gastric fermentation, and colic and so forth." Apart, however, from difficulties arising from the fog of ancient nomenclature, gout and angina pectoris seem in some curious way to be closely allied. Sir Clifford Allbutt quotes a case, the notes of which were sent to him by Dr. Gayford, as follows :

" Male, aged 68, engaged in large commercial affairs, had frequently had recurrences of pain and tightness across the chest. This would pull him up while walking, and might seize him even while lying quietly in bed ; the pain would extend to the left shoulder, and at times down the left arm. The heart at such times was most irregular, often 120°, with a cantering rhythm. Trinitrine relieved these states. On 21st November he had an attack of heart failure, pulse uncountable, jugulars distended and throbbing violently ; then he was seized for the first time by gout, frankly in the feet, and on its appearance all the cardiac disturbance ceased, the pulse became regular, at the rate of 60, and the relief so far has proved permanent. Previous treatment addressed to gastric disorder had done some good."

Rheumatism, using the term in its right sense, has also a very close connection with angina, for there is no doubt that those who have suffered, or indeed are suffering, from acute rheumatism, are liable to a form of aortitis which in time may give rise to true angina, though generally of a mild sort. In such cases there are sudden attacks

of anginal discomfort, which may be frequently repeated. These attacks are unpleasant, but they are fleeting and occasion no alarm to the patient. They may occur daily, or even two or three times a day, for prolonged periods without progressing in intensity. They may at first be accompanied by considerable nervousness, and what Sir Clifford Allbutt calls "reasonable apprehension," but when the victim becomes accustomed to them, he ceases to fear them. The patient either bends forwards or arches his back and remains stationary until the attack passes off. I can recall one such case in a man of over 60, who had had rheumatic fever at the age of 30. There was a slight roughening of the first sound, best heard at the right base, which, however, caused him no apparent inconvenience, because up to the age of nearly 50 he had played tennis and other vigorous outdoor games. After 60 these attacks began, and during the last twelve months of his life would frequently afflict him three or four times a day. He died at the age of 75, and during the last few months of his relatively effortless life he never had an attack.

In the difficult matter of making a certain diagnosis on the subject of angina major, there are three cardinal points to remember. The first is the peculiar and startling pain; it is a pain like no other pain, and is usually sternal in seat. It is apt to travel down the left arm, or both arms, and it is provoked by exertion or movement. Secondly, all movement is arrested, even of breathing. The patient is, as the French say, "nailed to the spot." The third is a curious sense of impending death. These three cardinal symptoms may be accompanied by other signs,

such as vasomotor disorders, breathlessness, restlessness, and some evidence of circulatory imbalance.

It is, however, necessary to realise that all anginal attacks are not of this severity. Some early attacks are accompanied by a pain so slight in degree as to cause their victims but a passing inconvenience. And yet, even in these the pain is like no other pain. As Clifford Allbutt says, " even in these minor skirmishes it brings with it a peculiar malice, a warning, innermost touch, incomprehensible, vaguely startling." " If," as Sir James Goodhart has said, " these larval forms of angina were more seriously reckoned with, we should hear less of the rarity of the disease." We have, then, to distinguish between the mock disease, pseudo-angina, on the one hand, and minor degrees of real angina on the other. The differentiation is by no means easy in every case, but no effort should be spared to arrive at a true conclusion.

Chronic Bronchitis, with its accompanying emphysema, is a disease upon which a good deal of wholly unmerited sympathy is frequently wasted. It is a disease of the gluttonous, bibulous, otiose, and obese, and represents a well-deserved Nemesis for these unlovely indulgences. It may of course be freely admitted that some cases of chronic bronchitis may be the result of other more legitimate and more serious causes, such as heart disease, aneurysm, renal disease, and intra-thoracic tumours, but the majority of cases are undoubtedly due to surfeit and self-indulgence. Ordinary " winter cough " seems to affect the two sexes about equally, with a slight preference for men. The patient's first complaint is of a cough, usually preceded by some wheezing, which troubles him

chiefly in the early morning. This is terminated by the voiding of a variable quantity of muco-purulent expectoration, and except for more wheezing immediately after meals, there is comparative freedom from coughs for the rest of the day. When, however, the cough becomes more persistent and continues through the morning, the sufferer takes notice. Urged thereto by his wife, he will consult the local chemist and be given a sedative lozenge, which affords a certain amount of relief. As matters progress he is moved to consult a doctor, who may prescribe a sedative mixture and tell him to keep indoors and avoid draughts. If, instead of doing this, the said doctor were to take the bull by the horns and explain the real situation, he would save the patient a great deal of subsequent misery. The proper attitude to adopt in the presence of a commencing chronic bronchitis is not one of sedative sympathy, but one of rude remonstrance. It should be pointed out that overfeeding, alcohol in excess, and lack of exercise inevitably and deservedly bring a motley host of troubles in their train, of which bronchitis is emphatically one. Such cases are unfortunately too often allowed to drift into irremediable distress for want of a little plain speaking at the outset. It is still the primitive custom to regard all affections of the air-passages as due to a " chill," and to treat them with poultices, bronchitis kettles, opiates, and beef-tea at eleven ; whereas in reality such diseases, when they are not due to microbic activity, are the result of defective elimination of toxic suboxides, and should be treated by purging, starving, blood-letting, and fresh cold air.

The chronic bronchitic who is treated on the ordinary coddling lines soon develops emphysema,

and becomes a real invalid who is obliged to lead a restricted life and follow a sedentary employment. It is then that his "winter cough" begins. In London fogs and other circumstances, where the atmosphere is laden with irritants, this winter cough becomes a serious matter and causes real suffering to the patient. The symptoms pass off as summer approaches, but as time goes on the summer intermission grows shorter every year, and the winter disabilities more pronounced. When the disease is thoroughly established, the cough becomes constant and severe, and is punctuated by paroxysms during which there may be a considerable amount of cyanosis of the face; and each paroxysm leaves the patient breathless and exhausted. At this stage the breathlessness eventually becomes obvious to the onlooker, and is liable to exacerbations from very trifling causes. The end comes by increasing want of aeration of the blood in the lungs, and the ponding back of the blood in the right ventricle with consequent enlargement of the liver, and ultimately œdema of the legs. The diagnosis of these cases presents no difficulty. It is, however, well to be quite certain that a chronic bronchitis does not mask a tuberculous focus. Whenever the signs are more marked at the apices, or even at one apex, than in the rest of the lung, the question of tubercle should come prominently to the front, for even where the physical signs seem to be purely catarrhal and an examination of the sputa fails to reveal the presence of the bacilli, we have to remember that the age of winter cough is also one of the ages of tubercle. The treatment of these cases, if taken in time, is often very satisfactory. If the gluttonous and bibulous person can be induced to give over his

gluttony and relinquish his bibulosity, and incidentally to reduce his obesity; and if he can be persuaded to take a reasonable amount of exercise in the open air, so as thoroughly to metabolise his waste products and ventilate his lungs, he may succeed in avoiding the wrath to come. Too often, however, we are first brought into contact with these cases when the trouble has already become stereotyped. An acute attack which is superimposed upon the chronic condition often provides the first occasion for medical advice. When the acute attack has subsided, the best treatment for the chronic condition itself is to give such drugs as will enable the patient readily to get rid of his sputa, for in these cases the lungs are being called upon to act as emergency excretory organs, and it is the part of the therapist to aid them in this endeavour, even while he is reducing their labours, in so far as he is able, by stimulating the legitimate emunctories. In the attempt to increase metabolism, thyroid extract is very useful, and it may be profitably combined with iodine in some form. It is a curious thing that in spite of the laudable attempts of pharmacologists to discover an iodine preparation which will avoid the frequent unpleasantness in connection with iodide of potassium, no preparation has yet been found which acts as a substitute for this rather nauseous salt. I have always found that 7 to 10 grains of iodide of potassium, with half a grain of thyroid extract in solution, together with bicarbonate of potassium and infusion of senega, usually acts very well in such cases as we are considering. Except where an acute attack is superimposed upon the chronic condition, poultices and hot fomentations must be avoided at all costs, not only because they do harm

by still further relaxing the bronchial mucosa, but on account of the false mental atmosphere which they create. This objection does not apply to full baths and hot air baths, for these reinforce the emunctories. The action of the skin in these people is usually defective, and sensible relief is obtained by free perspiration thus obtained. The inhalation of steam, which may be medicated with compound tincture of benzoin, will often relieve the irritation provoked by the constant coughing. "Something for the relief of the cough" is one of the most insistent demands of the patient, but it is very unwise to use the ordinary sedatives for this purpose. If the condition amounts to bronchorrhœa, then the iodide of potassium should give place to 20 minims of terebene with tolu. The terebene may also be given as an inhalation. If, by reason of bronchiectasis, or from other causes, the sputa are offensive, creosote should be given by the mouth. The capsules containing 3 minims are exceedingly useful. Ringer suggests chloride of ammonium in a spray with wine of ipecacuanha. I have heard this well spoken of, but I have no experience of its use.

Although, in pronounced cases of chronic bronchitis, the attention of the patient and his friends, and also that of the physician, is liable to be focused upon the lungs, the real danger resides in the circulatory system. The accompanying emphysema obliterates a considerable number of the blood vessels in the pulmonary area which, when combined with the general congestion caused by the chronic bronchitis, renders it difficult for the right ventricle to pass the blood through the lungs to the left auricle, and all the troubles of a venous plethora are liable to show themselves. I have, in another place,

extolled venesection in connection with hyperpiesis, and I here reaffirm my belief in its very great efficacy in the venous engorgement of a chronic bronchitis. If, for any reason, a "blooding" should be deemed undesirable, then a certain amount of relief can be obtained by leeches.

In the case of chronic bronchitics who are sufficiently well off, the winter should not be spent in England, certainly not in London. The towns on the Riviera are sometimes recommended to such people for winter residence, but on account of its rapid and decided diurnal variations, the climate at such places is liable to be very treacherous. Madeira and the West Indian Islands are far more suitable. Indeed, owing to its comparative equability, and its high relative humidity, the extreme south-west coast of England is by no means to be despised. Bournemouth, Falmouth, Sidmouth, and Torquay may be advised with confidence to such patients. Vernet-les-Bains, at one end of the Pyrenees, the Mediterranean end, and Pau, at the Atlantic end, may be confidently recommended for winter sojourn in such cases.

The above measures are, however, merely palliative. The disease is one of defective metabolism, and unless it is treated with this fact steadily in view, no real progress will be made. The dietetic excesses must be cut down with a ruthless hand. Two or three days' fasting, as in the case of diabetes, should inaugurate the treatment, and very simple fare of a lacto-vegetarian type must be insisted upon from the commencement. As soon as possible the patient should be encouraged to go out, and a gradually increasing amount of exercise should be insisted upon.

Certain of the French health resorts, especially Mont Dore, La Bourboule, and Cauterets, make a speciality of treating those who suffer from chronic bronchitis and chronic laryngitis, and much benefit may be derived from a summer "cure" at one of these places. Chronic bronchitics feel the cold unduly, and this leads them to overclothe themselves with several layers of woollen undergarments, and out of doors they are usually surrounded by mufflers and fur coats, even in summertime. This should be strongly protested against, and it should be pointed out that chronic relaxation of the skin thus induced seriously retards recovery. General massage, which should be followed by such hydropathic measures as may easily be undertaken in the patient's own home, may be recommended.

Chronic Laryngitis is even more common than chronic bronchitis, probably because in addition to the causes which bring about the latter, the faulty use of the voice, mouth-breathing, and dusty atmospheres, are additionally operative in the case of the former. Some of the manifestations of chronic laryngitis are well known. There is, for example, the husky voice of the alcoholic, the voice which tires quickly and tends readily to lose its tone and control, the voice which does not clear itself before midday, and the one which remains hoarse for weeks after a common cold. In certain people the larynx and pharynx act as very efficient barometers of the general health, even very slight departures from ordinary fitness being displayed in a corresponding modification of the individual's voice. A relaxed larynx, especially if it be accompanied by a relaxed tracheal mucosa, may give rise to very disagreeable

symptoms, so unpleasant as to drive the sufferer to the conclusion that something must be seriously wrong with his air-passages. Chief among these symptoms is a cough of a fairly characteristic kind. It is violent; so violent as occasionally to mimic whooping-cough, especially when it ends, as it not infrequently does, with an expiratory effort which causes retching. In most cases the amount of sputum voided by this seemingly supreme effort is quite insignificant, but when the trachea takes part, the amount is, on the contrary, so considerable as to make one wonder where it could all have come from, and the character of the cough loses its violence. When it is not the aftermath of an acute attack, this form of chronic laryngitis arises in people who are delicate or run down—the business man of many worries who is in want of a holiday, for example. It should be treated not by warmth and sedatives, but by cold and stimulating expectorants; not by ipecacuanha and antimony, but by acids, strychnine and quinine. Perhaps the best treatment for such cases is a change to a bracing climate. I have known patients who resisted all treatment while at home, to recover themselves completely and rapidly after a few days at Margate or Cromer.

Chronic laryngitis, like chronic bronchitis, is, however, in the majority of cases a constitutional disease of the gouty variety, at the bottom of which lie overfeeding, overdrinking, oversmoking, constipation, and lack of exercise. When this is obvious, the case must be treated on the lines already indicated in treating of chronic bronchitis.

We must not, however, be led lightly to place a chronic laryngitis in either of these two categories.

Syphilitic disease, and tuberculous, will all too readily masquerade as simple catarrhal affections, and we have to remember that pressure on the recurrent laryngeal, as by an aneurysm or other thoracic tumour, may give rise to hoarseness and partial aphonia. It is a good rule which bids us refer a case of persistent hoarseness to a laryngologist. Œdema of the glottis is fortunately a rare occurrence, but it is very alarming when it does arise. It may be suspected when the element of dysphagia is out of proportion to the amount of inflammation present, especially if the inflamed tissues have a bluish tinge. Where its presence is undoubted, purging combined with blood-letting or leeching should be tried ; failing which, intubation of the larynx or tracheotomy may be necessary.

The zone round about the fifth decade is one of the danger zones of pulmonary tubercle. Into the general question of this disease I do not propose to enter, but I desire to make a brief reference to the question of its treatment by the Spahlinger methods, of which the profession has from time to time heard something. The methods consist in the administration of (*a*) a serum for acute and advanced cases, and (*b*) a vaccine for slight or chronic cases and for prophylaxis. Similar methods have of course been employed before ; Spahlinger has merely gone a little further than his predecessors by working on a fresh conception of the bacillus and its habits. Koch's tuberculin failed because its inventor believed the bacillus which bears his name to be as other bacilli are, which it is not. The ordinary type of bacillus, that of diphtheria or tetanus, for example, when cultivated outside the body, readily yield up their toxins : their toxins are, in fact, their excreta. With the bacillus of

tubercle this is not so. When cultivated outside the body, Koch's bacillus lives a peaceful impeccant life and stoutly refuses to produce toxins. It is of course the toxins which count, not the bacillus, and Spahlinger had the insight to realise that the real problem resolved itself into devising a means whereby the bacillus might be induced to yield up his toxins. In the human body, he argued, the toxins are produced, for the reason that the bacillus is attacked; if therefore it could be similarly attacked outside the body, the toxins would be produced. The cuttle-fish does not produce his ink until he is pursued. The bacillus might behave like the cuttle-fish. This theory proved to be correct. By various methods, physical, chemical, thermal, and luminary, he attacks the bacilli, and compels them to yield up the coveted toxins.

Having obtained the toxins, Spahlinger set to work to differentiate between them, with the surprising result that he was able to distinguish between no less than twenty separate and distinct kinds. In order to prepare his serum, he takes each of these twenty odd toxins separately, and injects it, by graduated doses, into a horse. Each horse receives one kind of toxin only. To prepare a serum it therefore requires twenty odd horses. When an individual horse receives his dose of toxin he immediately proceeds to form an antibody, in order to neutralise it. As the dosing with the toxin proceeds, the horse produces an increasing amount of antibody, so that at the end of a certain period the horse's blood is fully charged with this antibody. The twenty odd horses, having now manufactured their respective antibodies against the twenty odd different kinds of toxin, they are

all bled. The resulting partial sera are all brought together, and Spahlinger's " complete serum " (Serum Global) is the result. This is then put up into ampoules, and is issued with the necessary instructions for use.

Now, if this complete or " global " serum, full of the antibodies manufactured by the various horses, is injected into the body of a human being suffering from tuberculosis, the horses' antibodies will immediately set to work to neutralise the toxins with which the bacilli are killing the human being. It is only a question of time and reinforcements. The mixed infections are treated on precisely similar lines. The streptococci, pneumococci, and others are relatively simple organisms, and are less difficult to " antibody," as soon as their chief ally, the tubercle bacillus, has been denuded of his sting.

So much, then, for the principles on which the serum is made. This produce of hard thinking and brilliant scientific application is suitable to cases which are being overwhelmed by the disease ; cases where fever, emaciation, night-sweats, and other salient symptoms proclaim that the natural defences have broken down, and the enemy toxins are marching to victory. The horses' antibodies gradually neutralise the toxins, and the patient's condition at once improves. With perseverance and attention to the ordinary canons of hygienic life, victory in most cases is practically assured.

I have already said that the behaviour of the tubercle bacillus is more complicated than that of the ordinary bacillus. But the complexity is shown not only in behaviour, but also in composition. To employ Spahlinger's favourite illustration, the bacillus of tubercle may be compared to a

pocket lead-pencil with a point-guard. That is to say, it consists of tin, paint, wood, and graphite or black lead. In order to prepare his other remedy, his vaccine, Spahlinger takes each of these component parts separately and injects them into a patient. First of all he injects the "tin," and when the patient is producing an immunity against tin, he receives "tin" plus "paint." As soon as he produces a proper defence against "tin plus paint," he receives "tin plus paint" plus "wood." When he has been thus taught to build up an immunity against tin and paint and wood, he receives the "graphite." He is now immune to all the components, and therefore to the whole bacillus. This is the vaccine. It differs materially from the serum both in its preparation and its effects. The serum, as we have seen, neutralises the toxins by means of antibodies elaborated by horses (passive immunity), whereas the vaccine trains the patient's organism to elaborate its own antibodies (active immunity). Or, to put it in another way, the vaccine attacks the cause (the bacillus), while the serum nullifies the effects (the toxins). Vaccines call forth the natural defences of the human patient; serum is necessary only when these defences have broken down. Vaccines are suitable to early cases, to mild cases, to long-standing cases of a chronic type. They are, in fact, suitable to the vast majority of cases. Serum is necessary only in acutely advancing cases, and when it has done its work of neutralisation, it is necessary to give the patient a course of vaccine so as to guard against a recurrence. The serum cures, but it will not protect. The vaccine both cures and protects.

I am not a bacteriologist; I am merely a

clinician, and in my capacity of clinician, not altogether devoid of the critical faculty, I make so bold as to affirm that Spahlinger's methods succeed in a very large percentage of cases. I am no believer in royal roads either in therapeutics or in anything else. To be real and permanent, progress must be based upon fresh ideas, and Spahlinger's ideas are as fresh and original as anything in modern medicine. The application of these ideas has been received with a certain measure of scepticism by the profession at large, but no real criticism has been applied to the underlying principles. And it is, after all, the principles which count. Spahlinger's own application of the principles may be susceptible of improvement; it probably is, but until the principles themselves are proved to be unsound, it is senseless to rail against the methods of their application. It is unfortunate that financial considerations should have prevented Spahlinger from broadcasting his products, because medical men, quite justifiably perhaps, decline to give their confidence to remedies which they have not themselves had an opportunity of testing. It is nevertheless the case that the evidence of those who have had an opportunity of employing these remedies is uniformly in their favour. In the face of such testimony as is forthcoming from reliable witnesses, eager to furnish it, any court of law could not fail to give a unanimous verdict in favour of the claimant. I refrain from adding anything in contempt of the chatter about secret remedies with which some people have sought to obscure the scientific and practical issues of Spahlinger's work. There is not, and never has been, any secrecy about his principles or their application. Certain details of preparation

are for the moment withheld, lest the eager profession and the impatient public should be presented with a worthless article claiming the Spahlinger parentage; an attitude of wise discretion which was adopted in the case of insulin.

Asthma is a disease which afflicts people at every stage of life. It is probably more common in children than in adults. But when a person arrives at the stage which we are now considering, when other disabilities conspire to render life difficult, the person who may have been subject to asthmatic attacks for many years is moved to bestir himself in the direction of relief.

The present-day views concerning asthma, and their outcome in treatment, represent one of the most notable and encouraging advances in practical medicine which this generation has seen. It had long been recognised that asthma was not so much a disease as a symptom complex, which was due to a very large number of exciting causes. The underlying want of stability in the nervous system was predicated as an essential feature in the production of the symptoms. To such an extent was this fairly obvious position pushed, that there were not wanting those who contended that in the majority of cases the victims were merely neurotics. This facile explanation was applied with great confidence to those who suffered from the curious form of disease which was known as " cat-asthma." Cat-asthma, though fully dealt with by Dr. Hyde Salter in a remarkable book published in 1868, was regarded with a certain amount of contemptuous incredulity by many people who ought to have known better. An article published as lately as 1915,([11]) attributed cat-asthma to what we should now call suggestion. The writer says :

" Those who declare their liability to it (cat-asthma) must have somehow become acquainted with the fact that an immediate contact with an unhealthy cat may convey an infection with ringworm, and that the stroking of it may leave hair, and perhaps the favus fungus, sticking to the hand, which, when subsequently applied to the eyes and nose, may produce a series of symptoms similar to hay fever. Hence, the idea that they may be exposed to the risk of such annoying consequences leads them to fear even the mere presence of a healthy animal in a room in which they find themselves. The assertion that the incidence of dyspnœa indoors would at once reveal the existence of its supposed cause (the cat) where it was previously neither known to be nor suspected by the sufferer may easily be explained, for there are very few houses in which such pets cannot be found."

Hyde Salter's description ([12]) should have been sufficient to make such a suggestion impossible. He says :

" I cannot recollect at what time I first became subject to the cat-asthma, but I believe the liability has existed from the earliest period of life. I believe some asthma would present itself if I were sitting by the fire, and the cat sleeping on the hearth-rug ; but the effect is much greater when the cat is at a distance of one or two feet, or still closer ; it is still further increased by the raising of the fur and moving and rubbing about, as is the habit of cats when they are pleased, also by stroking their fur ; but most of all when they are in the lap just under the face. The influence seems to be stronger in kittens from two months old and upwards than in full-grown cats. Having been almost always accustomed to cats, I have had abundant opportunity of testing the peculiarities of this singular phenomenon."

In the struggle to obtain some solid facts in connection with the ætiology of this disease, it had been noticed that asthma and urticaria were associated in a very definite manner; in the sense that the nettle-rash would suddenly disappear to give place to asthma, and *vice versa*. It was then suggested that the attacks of asthma were due to an urticaria in the mucous membrane of the respiratory system. It was reserved for an American doctor, Mentzer, to show that cat-asthma and urticaria were in a sense interchangeable manifestations of the same disorder. He showed that certain proteins when rubbed into the broken skin would produce a nettle-rash in certain asthmatics, and that if the patients could be kept clear of the influence of the said proteins the attacks of asthma would cease. The work thus initiated has been carried on by Chandler, Walker, Long, Talbot, and others in America; by the late Arthur Latham, and Frank Coke, in this country, with the result that we now know that quite 50 per cent. of cases of asthma are due to the operation of foreign proteins. The result of this has been that not only has the existence of cat-asthma become triumphantly established, but that the study of the matter in connection with the cat has opened the door to a great deal of interesting and effective knowledge. Before leaving the question of the cat, however, let me say that there are people whom nobody would accuse of being neurotic (Lord Roberts was one) who cannot tolerate the presence of a cat in the room. They do not know why, no definite symptoms are aroused by the contiguity, but it causes them a vague discomfort, which, after a time, becomes quite intolerable. Such people are probably partial cat-asthmatics—that is to say,

they are sensitive to cat hair, but to an extent which falls short of the production of asthma or any of its interchangeable manifestations. Inasmuch as cat-asthma is the type of a symptom complex produced by foreign protein as a class, it may be well to mention here that the condition is said to be interchangeable not only with urticaria, but also with eczema, angio-neurosis, migraine, and even epilepsy. The proteins to which an individual may be sensitive are grouped by Coke into those derived from foods, animal hairs, bacteria, and pollens. The foods which seem to be the most common in producing symptoms are oats, wheat, beans, white of egg, tomatoes, and cow's milk. Amongst feathers those of the parrot, the ordinary farmyard hen, ducks, and geese. Amongst hairs, horse dandruff, goat hair, dog hair, and, curiously enough, human hair. For the bacteria of the pollens, Frank Coke's very clear and explicit book should be consulted. Coke's theory, in so far as he can be said to advance one, is that the sensitiveness to these various proteins, shown by asthmatics, is in the nature of anaphylaxis. However that may be, the importance of these exciting causes of asthma cannot be overrated, and all praise is due to those whose labours in this field have been so fruitful of excellent results. If it be the case that the phenomena in connection with spasmodic asthma are explicable on the theory of anaphylaxis, it seems at first sight difficult to understand when and how the original dose sensitising the patient could have been given. This is fully considered by Coke, who gives several instances to show in what a subtle manner the sensitisation may take place.

The first is that of a child who had been given

albumin water for diarrhœa when a few days old. The child had no more egg until it was fourteen months old, and then, on being given some, he had profuse urticaria and a kind of fit. At various times afterwards on accidentally taking anything made with egg, the child was at once sick; urticaria would develop on his hands even after playing with egg shells.

The other case was that of a boy aged 8, who had suffered from asthma for six years. He was nursed by his mother until he was 7 months old, except on one occasion when she was ill, and he was given a few feeds of cow's milk with no bad effect. On weaning the child, it was found he could not take cow's milk; he used to vomit and have nettle-rash. He was put on goat's milk with complete success. On one occasion he was given cow's milk by a disbeliever when he was away from his mother, and it made him very ill. He was gradually given cow's milk, and as it did not make him sick or give him a rash, he took it normally as children of two years will. He then began his asthma.

Hay fever is, of course, of the same nature as asthma, and is provoked by the same kind of foreign proteins. The obvious treatment for these cases when the culprit protein has been discovered is to desensitise the patient to that particular protein. The technique of this desensitising is at present rather elaborate and should be left to those who are accustomed to use it. Both the manner of detecting the causal protein and the manner in which the desensitising should be done are very well described by Coke in his admirable book.

All cases of asthma, however, cannot be placed in the category of a symptom complex due to a foreign protein. We are all acquainted with the

asthmatic who gains immediate relief by moving to another locality. It is now said that many of these cases can be explained by the fact that an animal, say a cat or a dog, has been left behind, or some ivy or other creeper avoided by the change of locality. I do not think this explains the whole situation, though it may. Bronchial asthma is the term sometimes employed to describe true asthma which supervenes upon an attack of sub-acute bronchitis. The victim is usually obese and middle-aged, and of the type that we have already discussed in connection with chronic bronchitis.

Most of the types of asthma which are not due to foreign proteins are caused by some gastro-intestinal derangement. Constipation accounts for a good many, and when combined with over-eating and lack of exercise, it is responsible for the majority. Asthma sometimes attacks women at the menopause, but here, again, it is usually the woman of the obese and florid type who develops asthma, because she has lost the subsidiary excretory organ.

Enlargement of the Prostate Gland was until recently catalogued among the very serious difficulties to which an elderly man was obliged to look forward. Before the operation for the removal of the gland, men on falling ground were condemned to what was called "catheter life," with its almost invariable concomitant of occasional toxic seizures called "catheter fever." It was not only to such personal inconvenience that the sufferers were subjected, but to the practical certainty of the trouble spreading upwards and involving the whole of the urinary tract. As prostatic enlargement is an insidious matter which frequently does not come under the notice of the

doctor until it is well advanced, it is worth while to glance briefly at its incidence and its possible consequences.

One of the first signs of anything being amiss with the organ is that the patient has to leave his bed in order to relieve his bladder, first once, then twice, then several times a night; and that even when he has performed the act of micturition, there is a feeling that something remains behind. The victim usually attributes this difficulty either to his advancing age or to some other cause. As time goes on, and the gland continues to enlarge, a certain amount of difficulty may be experienced in starting the act of micturition. Gradually the force of the stream diminishes, and what was at one time a final expulsive jet is reduced to a mere dribble. The bladder has now ceased to empty itself properly, and the amount of residual urine increases. This generally leads to a hypertrophy of the muscular coat of the organ, which for a time may be successful in overcoming the obstruction, but like the heart in similar circumstances, when the strain is too great, dilatation succeeds upon hypertrophy. It is then the turn of the ureters to be attacked, their mouths distend, and the upward pressure continues until the pelves of the kidneys are reached, which in their turn distend the kidneys themselves. These important organs, now no longer able fully to void their contents, become converted into veritable sacks, and their noble tissues are contracted by the ever-increasing interstitial encroachment. The amount of urine secreted is very considerable; it is pale, usually of low specific gravity, very deficient in solids, and generally shows a certain amount of albumin.

The chief symptoms complained of are lumbago first, and a progressive loss of weight. The polyuria and emaciation frequently, of course, give rise to a suspicion of diabetes. The amount of vesical distension which may be caused by this train of events is sometimes very considerable; but so long as the urine remains aseptic, the patients seem to tolerate their discomforts. When the urine ceases to be aseptic, dribbling begins, and ammoniacal decomposition—a state of matters which is very depressing both to the patient and to his friends. Some inexperienced practitioners attempt to wash out the bladder in order to get rid of the infection. This is not only a useless procedure, but in many cases a very dangerous one. It should be laid down as an ordinary rule of practice that as soon as an enlarged prostate gives any real trouble, or threatens the efficiency of the bladder in any degree, the removal of the gland should be insisted upon. Dr. R. Saundby ([13]) says :

"The technique of the operation is now so perfect, that in the hands of a skilful surgeon it presents little risk, and it may save years of misery. The operation of prostatectomy is one of the greatest benefits that the advance of modern surgical technique has conferred on old age. The sufferings that were endured by the subject of prostatic enlargement in times past were terrible."

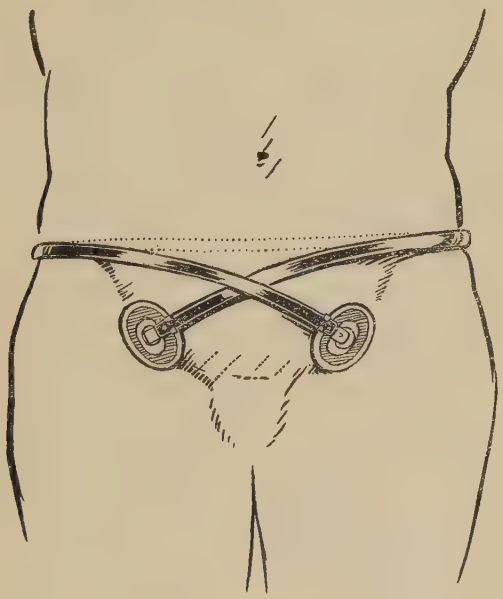
The milder cases of prostatic enlargement may, of course, be dealt with by means other than surgical. Hertoghe, of Antwerp, was the first to point out that some cases, at any rate, of enlarged prostate, were due to a disthyroidism, and were definitely benefited by thyroid medication. I have seen several cases in which thyroid extract, combined

with iodine, has done a great deal of good. In one case, after six months' treatment, the gland was reduced practically to normal. Kenneth Walker is of opinion that the maximum size of a prostate gland is reached at about the age of 60 years, and that from that time onwards there is a gradual diminution in size. That is no doubt the case where the original enlargement is moderate only, for it is in accord with the findings of most pathologists, who say that all the internal secretory glands tend to die down, both in size and function, as the years advance.

No satisfactory explanation is as yet forthcoming of the cause or causes which give rise to an enlarged prostate. Fortunately the gland is fairly easily reached by the examining finger, and in elderly people who admit to any derangement of the urinary system it should always be examined.

Another penalty attaching to advancing years is a **Hernia.** This is usually inguinal in men, femoral in women, and—much less frequently—umbilical in either sex. The cause is not, as in younger people, to be sought in a strain. It is to be found in the steady and increasing pressure of the prolapsed viscera, and their surrounding fat, upon the relaxed and weakened inguinal and femoral rings. In elderly folk, herniæ come stealthily, and advice is often not sought until they have become well established. Not infrequently a hernia is discovered accidentally during an ordinary examination of the abdomen. If it is detected sufficiently early, a truss may do all that is necessary, but trusses, as they are usually made, are very inadequate and very uncomfortable. Even when they fulfil their object of keeping the hernia reduced, they very often press upon

nerves and muscles in such a way as to give rise to a certain amount of impairment in the movement of the lower limbs. These supports should be constructed so as to obtain the counter-pressure not from the lumbar region, but from the opposite inguinal region. When properly moulded and fitted, such a truss (see Fig.) obviates any danger of undue pressure upon the glutei, and it prevents a hernia



from appearing in the opposite groin, an event which is very likely to occur. Ill-fitting trusses may give rise to very curious symptoms. I was consulted by a man of 50 who complained of a relative inability to use the muscles in his left leg, which he had discovered accidentally. The inability, which was worse at some times than at others, was often, but by no means always, accompanied by pain, especially on movement. He was quite unable to account for the trouble, and

feared that it might be the commencement of "creeping paralysis." On examining him I found that his reflexes were normal, the muscles were not wasted, and I could not elicit any pain on pressure anywhere. Attempts on his own part, however, to adduct the left thigh, caused a certain amount of pain on the outside of the leg. On examining his back I found that he was wearing a truss, and that the arm of the truss joining the two pads pressed upon the upper part of the gluteus maximus, and that the muscle on this side was deeply indented from pressure. After a good deal of trouble I succeeded in getting a truss made which avoided this pressure, and his symptoms gradually passed off. The initial disability for which he consulted me was a definite limp, amounting to a serious though transient loss of power if he became really fatigued.

A hernia, at the best, is a nuisance, but a tolerable nuisance; at the worst, it is a serious menace to life. In thin people it is tolerable: in fat people, intolerable. Saundby ([14]) says in connection with with an irreducible hernia:

"The propriety of an operation should be considered, as this is the only means by which the patient can be relieved from the state of discomfort and even danger in which he is placed, for there is always the risk of strangulation, necessitating the performance of an immediate operation with all its disadvantages. . . . The position of the operation for the 'radical cure' of hernia is essentially different from what it used to be; then the operation gave only temporary relief, and almost invariably ended in relapse; now the closure is solid, and a permanent result may be confidently assured. Even a reducible hernia is a nuisance, a cause of discomfort and of possible

danger, so that under the altered prospect of securing, at little risk, complete immunity from further trouble, it is much better to have the operation performed at some suitable time before the parts concerned have got stretched and distorted."

Gall-stones, though they may occur at almost any age, even according to some in the newly born, are most common over 60 years of age. They occur more frequently in women than in men, in the proportion of about 7 to 2; the difference in the sex incidence has been ascribed to pregnancy, to the wearing of corsets, the relative want of exercise, and to constipation. Hertoghe has found in most of the subjects of gall-stones distinct evidence of thyroid insufficiency. Diet would seem to have considerable influence in their production. Ordinary symptoms of cholelithiasis, according to Mayo Robson,(15) are paroxysmal attacks of pain which, occurring at irregular intervals, often without apparent cause, start in the right hypochondrium or in the epigastrium, and radiate thence downwards over the abdomen and upwards even to the right scapula. The attacks are often accompanied by nausea and vomiting, and if very severe, by collapse. The attacks may be, and often are, followed by jaundice with its well-known symptoms, but this is frequently absent, more frequently than seems to be generally supposed. At times a feeling of fullness in the right hypochondrium accompanies the attack, but the formation of a clinically recognisable tumour is relatively rare, for it does not occur unless the ducts are blocked. These special symptoms are usually accompanied by much depression of spirits, want of appetite, dyspepsia, malaise, and loss of weight.

The attacks come on suddenly, like a bolt from the blue, when the victim is apparently in excellent health and good spirits. The pain is extremely severe; when vomiting occurs, as it generally does, it has the same relaxing and relieving effect upon the ducts as it exercises upon the tissues about the inguinal ring in a case of a strangulated hernia, so that, distressing though it be, it may bring about relief of the pain by allowing the stone to pass. In order to effect the expulsion of one gall-stone, several of these painful attacks may be necessary: even in the interval between the attacks, there is usually a considerable amount of dull pain and muscular rigidity below the right costal margin. The pain may give rise to collapse of a very serious nature; cases have, indeed, been recorded in which the agonising pain of a single attack proved fatal. The most painful type of gall-stone colic is that caused by a small stone in the common duct which acts in the same manner as a ball in a valve. It is well to remember that, especially in the very old, gall-stones, even when they try to escape, may give rise to surprisingly little pain of an acute kind.

I have known a kinked and loaded hepatic flexure to give rise to symptoms which were confidently, and by no means unreasonably, attributed to gall-stones.

The late Dr. William Ord drew attention to the occurrence of intermittent paroxysmal attacks occurring at fairly regular intervals of about a week, characterised by shivering, fever, and sweating, the whole picture being very suggestive of malarial fever, which eventually turned out to be due to gall-stones.

Sir William Osler says that the following com-

bination of symptoms is pathognomonic of the incidence of gall-stones in the common duct: (1) Jaundice; (2) Ague-like paroxysms characterised by chill, sudden sweating, and fever; (3) Pains in the region of the liver, with epigastric disturbance.

One of the serious dangers of gall-stones is the possibility of their ulcerating through, and giving rise to an acute abdominal or subphrenic abscess. The diagnosis between gall-stone colic and right renal colic is not always an easy matter. Mayo Robson says that the presence of a gall-stone is usually marked by tenderness on pressing the finger deeply over the region of the gall-bladder, or over some point between the ninth costal cartilage and the umbilicus. It has been suggested by way of treatment that as olive oil exerts a solvent action *in vitro*, it should have the same effect *in vivo*. Some people speak well of its effects, but I cannot endorse their view. Olive oil is, however, obviously quite harmless, and as it may be useful in a certain number of cases, no harm can be done in trying it. Belladonna, on the other hand, I have found useful; and I am in agreement with Hertoghe in his view that small doses of thyroid, however they may act, seem to reduce the liability to these attacks. During the actual paroxysm if hot applications and the drinking of half a pint or more of really hot water does not succeed in giving relief, recourse should be had to morphine. And when morphine is given for the purpose of relieving really agonising pain, such as that of biliary colic, it is useless to tender doses of a quarter of a grain. If it is to be given at all, let it be given in full measure. As I have already said, the pain of biliary colic appears to be less severe as people grow older, but if after repeated

attacks the suspicion that there are a great many stones to come away seems justified, or if there is reason to believe that one stone is playing the part of the ball valve, then an operation should certainly be advised. In these days the operation is not severe, and the amount of relief that it can give to people who have been suffering from biliary attacks for several months on end, is incalculable. Sir John Bland Sutton terminates one of his most delightful lectures, ([16]) recently published, with these words: "Although the medicine-man can point to some wonderful cures, and sorcerers can cast out imaginary devils, neither a sorcerer nor a physician can expel gall-stones."

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CHAPTER VII

THE LAST PHASE

The subject of longevity is one of never-failing interest. Though we are ourselves foredoomed to grow old, the problem of how not to grow old never grows old. The French aphorism, "Pour vivre longtemps il faut une bonne digestion et un mauvais cœur," represents in reality but a counsel of perfection, for you can no more acquire a strong digestion than you can achieve a callous heart—these, like the poet, are born, not made. There are, however, some things conducive to long life which are well within the sphere of achievement, but not many of them are so attractive as to induce people, by embracing them, to purchase longevity. In reply to their recommendation the mere material man would retort that he preferred the proverbial "short life and merry one." That is a phrase which, like "benevolent autocracy," might possibly spell an earthly paradise, if only there were some infallible means of ensuring the merriness of the one or the benevolence of the other. For the unpleasant truth is, save in the case of those which are terminated by accident, short lives are seldom merry ones. The person who lives *une vie mouvementée* and dies prematurely in consequence, dies of causes which produce much discomfort and suffering for a long time before the end comes. And even the *vie* itself, *mouvementée* though it be, is by no means necessarily "merry." The fore-

knowledge of the day of reckoning is ever-present to the victim : he displays it usually in his outward seeming and almost invariably in his temper ; so that if he himself affects to be merry on occasion, the charade does not deceive his intimates.

One of the conditions which is said to contribute to long life is that which of itself precludes *une vie mouvementée*, namely, poverty. Mr. William Kinnear, an American statistician, accumulated some evidence designed to show that, difficult as it is for a rich man to enter the kingdom of heaven, it is even more difficult for him to reach the haven of longevity. A cursory glance at the figures submitted in support of this thesis, suggests to my mind that there are so many exceptions and saving clauses, and so many factors which go unconsidered, that the thesis is not " sustained," as the saying is. If the rich die before their time more often than the poor or than those of moderate means, the cause is obviously to be sought in their greater opportunities for self-indulgence in matters dietetic. Now, it is not my experience that the upper classes in this country are more self-indulgent in such matters than the lower. It may be different in America, where the rich do not seem to have the same sense of the responsibilities attaching to wealth as usually prevails in this country, but I find that here, the lower middle classes and the lower classes, even those who frequent hospitals, are more commonly overfed or improperly fed (which is much the same thing, because unsuitability provokes surfeit) than the professional and leisured classes. Abuse is seldom the child of plenty : it is usually begotten of scarcity and insecurity. Temperance is more often found in abundance than in dearth.

Another American statistician is on surer ground when, from an examination of his figures, he draws the conclusion that those whose occupations keep them in the open air have a much greater expectation of life than those who work indoors. Employment in the open air connotes plenty of oxygen and a vigorous use of muscles, a combination which is in consonance with most of the canons of healthy animal existence. This is, in fact, another plea in favour of the wholesome exhortation, "back to the land," which, in spite of much insistence, has so far proved singularly ineffectual. Cities are much naughtier than villages, but they are much nicer; and it is very unlikely that considerations of longevity will ever lure people from the *vie mouvementée* of the former to the peace and pettiness of the latter. Tennyson prayed for "more life and fuller," but the two would seem, in this respect at any rate, to be mutually exclusive. The "more" of life is undoubtedly in the country; its fullness is in the city. But here again we must conclude that the statistician's thesis is not sustained, for it is well known that in all countries, scientists, men of letters, and statesmen have furnished their full share of octogenarians and even of nonagenarians. The real reason is that whether it be work in the fields, or work in the study, or work in the forum, it is the work which keeps people alive. The man who is always using his sword is the man who lives to use it longest: the rust lies in the scabbard. The members of the Académie in Paris are known to be long-lived, a fact which, according to one cynic, constitutes their sole claim to be called "the immortals." Many of the Prime Ministers in this country have attained to great age. Gladstone

at 89; Wellington at 83; Palmerston at 81; Russell at 80; and Beaconsfield at 77, by no means complete the list; and many continental statesmen and rulers can be cited to support the view that it is the really busy people who last longest. Bismarck was 82; Crispi was 84; Thiers was 80; Pius IX. was 86; Jules Simon was 82. All these great men were not only workers, but their work was strenuous, anxious, and responsible in the highest possible degree. The same is true of Georges Clemenceau, still happily with us, who is nearing his 83rd birthday.

A good many years ago the British Medical Association undertook an inquiry as to the relationship, if any, between longevity and stature. As might have been expected, the results were rather inconclusive, but the general impression emerged that people of short stature have a better chance of longevity than those of middle height. The majority of nonagenarians are well below the average height. Tall people, other things being equal, may be regarded as short-lived. We have to suppose that in their case, the retarding glands, resigning their functions too soon, an undue proportion of the original vital energy is expended in the creation of somatic tissues, thus leaving an insufficient reserve for nervous and vital emergencies. Their balance at the bank of physiological efficiency is a small one; though adequate in ordinary humdrum times and circumstances, it is liable to falter when the S.O.S. is hoisted. All real giants die early of tuberculosis, and most people of over 6 feet 3 inches—a height where normality may be said to cease and giantism to begin—are physically delicate and mentally not over-robust. This formula applies to the British

generally, but it does not apply to all the peoples of Northern Europe. There is some climatic factor in play which has not been elucidated.

The question of height naturally suggests the matter of weight. Here again it is the man of moderate or sub-medium figure that wins. Heavy people do not " make old bones," as the saying is. To judge by the figures published on weighing-machines and promulgated by responsible societies, it seems to be regarded as normal that a man should gain about a stone in weight in the years between 25 and 50. It is of course very abnormal and wholly unphysiological. Life insurance companies, who in such matters are not to be caught napping, pay very particular attention to this fact, and invariably look askance at candidates who show any tendency to obesity, especially when it is mainly abdominal.

It was, I think, Mark Twain who warned us to be very careful in the choice of our parents. To the question of longevity this advice is exceptionally applicable. Sir Benjamin Ward Richardson,(1) a physician prominent in the nineties, was so impressed by the factor of heredity in determining the expectation of life that he propounded a formula which some of his successors declare to be substantially correct. You take the ages at death of your two parents and your four grandparents, add them together, and divide the total by six. The quotient represents the number of years to which you may reasonably expect to attain unless you are killed accidentally. It is true that Richardson qualified his formula by introducing the element of temperament, but inasmuch as temperament would seem, in a large measure, to be a question of heredity, its introduc-

tion does not seriously impair such value as the formula may be held to possess. Insurance companies, whose wakefulness is a condition of their existence, are very much alive to the influence of heredity ; so much so, that one Swiss writer on the eligibility of candidates for life policies, goes so far as to say that the proposer's family history is of more importance than the data obtained from the personal medical examination to which he is usually subjected. There have recently been several letters in *The Times* instancing some very remarkable cases of family longevity. I know of one family of eleven members, eight of whom are over 70 years of age, and in perfect health.

That longevity is influenced by temperament there can be very little doubt. By the word " temperament " our forefathers understood the precise manner in which the " humours " of the blood were mixed or blended. The conception of " humours " of the blood was indulgently smiled upon for many generations, but the discovery of the internal secretions has given it a scientific warranty, in a sense not very far removed from its original. It is a matter surely of temperament that one man should accept and even welcome the disabilities of advancing years, while another not only declines them, but sets out to fight them. The difference between these two extremes is apparent in their attitude towards man's most salient characteristic, namely, the erect posture. There are those, and by no means all of them are scholars, who accept the stoop which is considered as characteristic of the scholar, and there are others who manage to maintain their youthful erectitude even though they be not compelled thereto by the *force majeure* of a protuberant abdomen. The

explanation of the difference is to be sought in those "humours" of the blood which we now express in terms of the endocrine glands. The first man is definitely thyro-deficient; the second predominantly adreno-cortical. Despite its constant use, and not infrequent abuse, of energy, the sanguine temperament, which questions all things and contests all things, lasts longer than the phlegmatic, which believeth all things and endureth all things. Impatience, even when it rejoiceth in iniquity, has a longer outlook than charity. He who suffers fools gladly should make his will in good time. Nothing is so insidiously destructive as boredom.

Bacon says, "They are happy men whose natures sort with their vocations." They are also, as a rule, long-lived men. An uncongenial mental environment is a canker to the nervous system, whose deadly influence so poisons life as to wring from the victim, while yet young, the cry, "My soul hath been a long sojourner, therefore let me die." For him, work is not real work, the work, that is, which brings the zest of endeavour and the joy of attainment; it is a mere treadmill, which the sooner over the better. But the man whose "nature sorts with his vocation" keeps his head in the collar because he loves it, and keeps himself alive in the doing.

An inquiry into the influence of the age of the parents at the time when a person is born was undertaken some years ago by a Hungarian, Mr. Korosi, who based his conclusions on the result of an examination of 24,000 cases. From these it would seem that in the interests of the offspring, the best time for a man to beget children is between the ages of 25 and 40. Children born of fathers

who are either under 25 or over 40 seem to have a lesser degree of resistance than those born within these limits. The best time for women to bear children is between 20 and 35. If born between 35 and 40 the expectation of life of the child is 8 per cent. less than in the case of those born during the optimum period ; and 10 per cent. less between the ages of 40 and 45. The second, third, fourth, and fifth children of the same parents are more likely to be long-lived than the first child, and the chances of longevity diminish with each subsequent child. Horse-breeders and cattle-breeders long ago decided that the best results are to be obtained from sires and dams in their prime. Advancing years in either parent are liable to give unsatisfactory results. The deductions are, more or less, what might have been expected ; but they are liable to a great many exceptions, not a few of which are very remarkable.

When a man has arrived at his haven, his object in most cases is to remain there as long as possible, but it is by no means always that he is prepared to pay the hygienic price for a long sojourn. Though death is by no means to be denied, so long as the life is healthy and fruitful there is every reason for prolonging it, and for ensuring, so far as this can be done, that its termination shall be peaceful —in the fullness of time, as the ripe fruit falls. By the time the pilgrim has reached his haven, he has necessarily acquired much knowledge concerning himself, physically, mentally, and temperamentally ; he has learned to live his life in the way which best suits him, so that the wise physician, when consulted, will make as few alterations as possible ; he will certainly advise no sudden or drastic changes. There are nevertheless some

details which are of importance from the points of view of comfort and resisting power which should be remembered in dealing with old people. Some of these I shall now proceed to consider.

The most noticeable feature about the physiology of old age is the slow and apparently dissociated reaction to stimuli of various kinds. This should be ever present to the physician whose daily work does not happen to have taken him much among old people, otherwise he may fall into grievous error. The blunted reaction of the aged is very apparent in the matter of pain. What, in an adult, would amount to excruciating and unbearable agony, such, for example, as that of biliary colic, becomes so much reduced in old age as to be described by the patient as a vague discomfort. To this rule of insensitiveness to physical pain there are two exceptions. One is that neuritis (using that term in its proper sense and not, as is now commonly done, as synonymous with neuralgia) is liable in old people to be exceptionally severe and exceptionally refractory to ordinary treatment. The pains, for example, which so often accompany the incidence or subsidence of herpes zoster cause so much suffering in elderly people as to compel the use of morphine. The other exception is furnished by pruritus. The generalised itching of old people is often troublesome and irritating, but it cannot be described as painful. When, however, it is concentrated upon one particular area, as upon a patch of eczema, especially if the patch is in the neighbourhood of the anus, the pain which it may cause is frequently intolerable, depriving the victim of sleep and rendering every movement, almost every posture during the day, a burden too heavy to bear.

Another and a very important exception to this rule of blunted response is provided by the enhanced susceptibility to drugs, which is the rule with the aged. W. G. Thomson (2) insists much upon this point, which is obviously one which should be laid to heart.

Another instance of this blunting of response is presented by the question of temperature. In old people the ordinary temperature of health is usually well below what is considered normal to an adult. It may remain steady at 97° F. This is a matter of no importance, but it is of considerable importance to remember that in such a person a reading of 98°·4 F. may represent a considerable febrile movement. Causes which we expect to produce a temperature of 101° F. in middle age may in old age produce no fever at all, and when the pulse-rate remains slow, and the pulse-temperature ratio therefore unaffected, it is all too easy for the observer to be thrown off his guard. The pulse is indeed seldom accelerated in old people, infections seldom quicken it, and emotions never—probably because the latter are never experienced. This fact explains why it is that the pulse-respiration ratio, upon which we are accustomed to rely in the young and vigorous, altogether fails us in dealing with the aged. Breathlessness on slight exertion is very common in old people, and when combined with the slow pulse which is so common as to be regarded as a normal accompaniment of old age, our ordinary standards cease to be serviceable.

The increased blood pressure of advancing years has already been referred to, but I venture to reassert my conviction that a high reading should not be considered normal in people over 70. The

formula that the normal pressure may be arrived at by adding 100 to a person's age, was taught at a time when blood-pressure studies were still in their infancy; it should no longer be regarded as even approximately correct. A blood pressure of 170 and over, in an elderly person, means that feeble or inelastic arteries are being subjected to a considerable strain, and that if measures be not taken to reduce the strain an explosion may occur on very slight provocation.

The blunting of reaction at this period is very apparent in the mentality. The memory, which while unusually good for events of long ago, becomes bad for recent events, and especially bad for names. In the emotive sphere the blunting in extreme cases is often quite shocking. A friend of mine tells the following story of a lean and slippered pantaloon who had an only son of whom he was deservedly proud. The said son was unfortunately lost at sea during a voyage across the Atlantic, and my friend was selected for the unpleasant task of breaking the news to the father. When he had accomplished his sad duty, the old man looked at the clock and said impatiently, "Tell them to bring me my beef-tea."

I have already said that the body temperature of the aged is definitely subnormal. This is true of the temperature as taken by the thermometer placed in the mouth, or the axilla; it is not always true of the temperature as taken in the rectum. There may be a difference of as much as two degrees between the readings as ascertained in the two localities. The explanation of this is by no means obvious, but it is probable that the diminished amount of heat necessarily engendered by the lowered oxidation is concentrated upon the im-

portant internal organs, at the expense of the relatively unimportant surface. The diminished heat is of course the result of the slower metabolism, which is to some extent inevitable. It should, however, be recognised that the slower metabolism is largely induced, and is certainly fostered, by the coddling habits to which old people are invited, and to which they all too readily yield. It seems to be the invariable custom for the elderly to overclothe themselves both by day and by night, and to exclude oxygen from the atmosphere of their rooms. Overclothing spares metabolism. The imprisoned warmth renders metabolic effort unnecessary, and without a plentiful supply of oxygen, combustion is impossible. An elderly gentleman who I was visiting told me that he suffered much from the sense of cold. "I always feel chilled to the bone." I replied that this was not surprising that his rooms were so intolerably stuffy. Whereupon he pointed to a thermometer hanging in a conspicuous place and said, "I don't think you'll find that this room is above 70° F." When I pointed out to him that it was a question not of temperature, but of oxygen, he was very incredulous, but after some persuasion he agreed to try the open window, and, doing so, was relieved of his frilosity. Stuffiness is a question, not of temperature, but of impurity and stagnation —an obvious fact of which there is far too little general appreciation. Overclothing is a common vice with old people. The extra burden of material is objectionable, not only from the point of view of lessening cutaneous respiration and wholesome metabolism, but also from its mere weight. Heavy clothing disinclines to exercise, and he who fails to take exercise cannot last.

Unfortunately warmth is agreeable to the aged, and cold is very disagreeable. Nevertheless a proper amount of cold air and cold water should be insisted upon. Leonard Hill, whose work on this and allied subjects constitutes one of the most valuable contributions to the science of everyday life, has repeatedly urged that cool air is essential to good health. In one place ([3]) he tells us that exposure of the naked body to cool air raises the basal metabolism from 50 to 100 per cent., and that since the amount of moisture which cool air is capable of holding is relatively small, the effect of breathing cool air is to favour a flow of secretion from the respiratory surfaces. This explains one, if not the chief, advantage of open-air treatment generally. In another place ([4]) he insists that, pleasant as external warmth undoubtedly is, it is very liable to be devitalising, so that great care should be exercised in allowing delicate and feeble persons unduly to indulge their affection for it. "Cold," he says, "is an enemy of the semi-starved: it is a stimulating friend of the well-fed." There are practically no semi-starved people in this country to-day, every one is well-fed, and the past majority grossly over-fed.

The practical application of these truths to the management of elderly people is simple enough in theory, but immensely difficult in practice. The belief that in the preservation of warmth and the avoidance of cold reside all the hygienic law and the prophets, is so ingrained in the mind of the public, from duke's son to cook's son, and more especially in their female representatives, that it will probably take many decades before people will listen with ordinary patience to Leonard Hill's teaching. And this attitude is emphasised in the

case of old people. The "honour, love, obedience," which, according to Macbeth, should accompany old age, are sufficient to ensure that the degree of desired warmth is forthcoming when demanded. That this is the very worst thing for them may be gathered from the statement of Dr. Lee Pattison.(5) "I have frequently found that the appetite and general condition of patients have been greatly improved by the production of shivering two or three times a day for short periods." Shivering, it is to be remembered, is a form of muscular exercise : it is a pity that it is so unpleasant.

Without attempting to push matters to these remedial extremes, much may be done for old people by a sustained crusade against coddling. Instructions on this point should be precise. The first thing to do is to prohibit the morning hot bath. Hot baths for cleanly purposes are not necessary more than twice a week at the outside, and should then be taken at bedtime. If a bath be taken in the morning it should not exceed 90° F. ; in reality 85° F. is better, and it should end up with an affusion of quite cold water applied to the abdomen — to stimulate the splanchnic vessels and favour peristalsis. The window should be open unless the external cold is intense. Short of such a bath the patient should be encouraged to expose his whole person to cold air for an appreciable time, and to apply vigorous friction either with his hand or a cloth during the exposure. In the case of those in whom reaction is sluggish, it is well to advise them to stand in a foot bath of tepid water during this process. This should be followed by such exercise of the muscles, especially of the abdominal muscles, as are suitable to the

case. If the bath is taken, people who are subject to eczema should be warned against the excessive use of soap, and if it is used at all they must be careful to see that the parts are thoroughly rinsed thereafter. This applies more particularly to the perineal, scrotal, and inguinal areas, which old people should always keep as cool and as free from irritants as possible.

It seems to be firmly held among the laity that it is possible to " nourish " or " feed " the skin by substances applied to its surface. Most scientists, on the other hand, affirm that no substance applied to the unbroken skin is capable of absorption. I don't know how these worthies explain the clinical evidences of the absorption of oily material, of which the salivation caused by the inunction of mercury is the best known. The present question is, however, as to whether the skin itself can derive any benefit from material applied to its surface. The following would seem to answer this question in the affirmative. The wife of a young medical friend of mine had quickened in her first pregnancy. She was not free from the usual vanities and nervousness incidental to such a period, and her husband dreaded the day when the abdominal distension would give rise to the usual superficial ecchymoses. Was there any known means of preventing them ? I remembered that another medical friend of mine had, in similar circumstances, rubbed olive oil on to the abdomen every night after quickening had taken place, with good results. The expedient was therefore tried in the case of the lady in question. Her abdomen at full time was enormous, but she never had an ecchymosis, and after the child was born the skin was without a blemish. The ancient Romans were

very fond of applying unguents of all kinds to their bodies, but with what object I do not know. One elderly gentleman, who had been a " beau " in his day, was distressed that the skin on his face and hands should be so dry and wizened, and asked if there was no remedy. I recalled the fact that an old French lady whose face was marvellously free from wrinkles had told me, in reply to my *félicitations* on that point, that she believed it to be due to having rubbed in cocoa butter every night for forty years. It would seem, then, that olive oil and oil of theobroma, at any rate, do actually feed or nourish the skin and keep it elastic.

The skin is a large organ whose maintenance in a state of efficiency is of more importance to the general health than is usually supposed. Cold influences are necessary to preserve its elasticity, and when elasticity begins to decline, all the other functions of the organ follow suit; protection becomes partial, heat regulation is interfered with, nerve conduction is numbed, and blood supply lessened.

The commonest way—and, alas, how common ! —of relaxing the tissues of the integument is by overclothing both by night and by day. Nothing apparently is easier than for a person to train himself to make ever-increasing demands for external warmth, to save himself, as it were, the trouble of combusting his own fuel. Certain it is that " The more you wear, the more you may," and the absence of the combustion necessary to create the internal warmth damps down all the fires of bright and healthy existence. With the majority, it is an article of faith, which brooks no discussion, that not only elderly people, but people in their prime, should be swathed from neck to ankle in woollen

underwear, heavy in summer, and in winter heavier still. This stupid heresy is the cause of much lassitude and malaise, and when it is persisted in, it so interferes with metabolism as to reduce the tissue changes to a minimum and the power of resistance to nothing. Underclothing, as I have frequently preached on many platforms, should be composed of material light in weight, which absorbs readily and which is easy of ventilation. Wool and flannel do not fulfil these desiderata, whereas cotton and linen do ; so in a less degree does silk. The under-garments, not of the aged only, though more especially of the aged, should be constructed of these materials so woven as to leave air-spaces in their meshes. There are various brands on the market, all or any of which are infinitely superior to close woven and close fitting flannel or wool. It surprises me that in this matter men have not learnt wisdom from their wives and daughters. Women nowadays are said by moral purists to be grossly underclothed ; they are obviously not overclothed. But there is no suggestion, there is certainly no evidence, that their present fashions are in any degree detrimental to health. It would indeed seem that the combination of physical exercise in the form of dancing, combined with a somewhat exiguous attire, has contributed very much to the good appearance and youthfulness of those who, thirty years ago, would have been securely placed on the matronly shelf. There is a slump in the business of beauty specialists.

Another serious objection to the present fashion of men's underwear is that it clings tightly to the body. The skin, being a respiratory organ, requires oxygen. The long-drawn, tight-sleeved, compressing garment described as being composed

of lamb's wool or camel's wool, imprisons all the moisture, together with the noxious gases, which struggle to escape from the integument, with the result that the ordinary man lives in a poultice consisting of dirty watery vapour and still dirtier dermic emanations. There would still be some hope for such a flannel-bound creature if the moisture and gaseous emanations could find a partial exit at the level of the collar-bones. According to the present fashion, among men however, this portal is sealed by a high tight collar, which not only prevents ventilation, but constricts the many important structures which pass between the head and trunk at this narrow isthmus. Tightness of clothing anywhere is objectionable; constriction of the neck is a crime. It interferes not only with ventilation, but with circulation, and disorganises nerve conduction. It is no wonder that the high collar man is slow-witted; he gives himself no opportunity of being anything else.

The person who is overclothed by day is certain to be even more overclothed by night. By their blankets ye shall know them, and their eiderdowns. The night covering should be as light as possible. In the case of the feeble, the room should be warmed before bedtime, and the bed itself should have a hot bottle placed at the foot, but the bedclothes should be as few as possible, and the patient should wear as little as possible on his person. The old-fashioned night-shirt made of fine linen or silk is infinitely preferable to the present pyjama fashion, especially when, as too often happens, this night attire is made of flannel or wool. It is, I am sure, advisable in many cases to counsel people to enter their beds quite naked. The skin is

thereby given a better chance of performing its respiratory function. Any form of night attire seems so to overheat some people as to produce nightmare. This simple direction has often brought me much gratitude. A method of avoiding undue heating of the bed is the use of Marcus Paterson's slumber-mats, already referred to. These mats should always be put in the beds of the old.

The bedstead of an elderly person should be so constructed as to slope gently from foot to head. The height of the former above the latter need not be more than 4 inches, and this can be procured by blocks made on the same principle as fracture blocks. There are two advantages which may be claimed for this contrivance. The one is that the venous blood from the lower extremities reaches the trunk more easily, thus saving a certain amount of blood pressure and cardiac force; the other is that it assists prolapsed colons and other abdominal organs to return to their natural positions. Moreover, by keeping the urine away from the mouth of the bladder, it lessens the number of exits from the bed for the purpose of making water.

Before retiring to bed an elderly person should thoroughly rinse his mouth with some mildly acid antiseptic lotion. The nostrils require very special attention, though they seldom receive any. In the Preface which he wrote to Sir Hermann Weber's admirable book, Sir Clifford Allbutt says:

"Concerning infections, I would add one more point to the precautionary methods of personal hygiene, namely, the 'toilet of the nose.' It has been a habit of mine morning and evening to rinse the nostrils well through to the throat; ordinarily

with water, but in times of epidemic with a disinfectant solution. So far I have never caught an influenza—or other infection—although on more than one occasion I have received a full puff of breath from a case of pneumonic influenza."

My own experience has been very similar. I attribute the complete immunity which I have enjoyed from influenza and respiratory affections generally, first to a vigorous and often unpleasant cultivation of the open window; and secondly, to a daily toilet of the nose. In the matter of the open window, it is curious to observe how many people speak contentedly of having it "a little bit open at the top." This means that the hot air escapes, but it makes no adequate provision for fresh air to enter the room from without. The hot air is consequently replaced by air which enters the room under the doors, and is probably very impure. The lower sash should be opened as well as the upper. For the toilet of the nose at night, I snuff up some ordinary water which is not infrequently inclined to be soapy, from the hollow of my hand, two or three times; and in the morning some soap off the shaving brush is inserted into each nostril by the little finger, high enough up to cause a vigorous flow of mucus and sometimes sneezing. When social engagements have taken me to the theatre or a meeting, or some other function where a large number of people have been congregated, before going to bed I use a nasal douche (Dr. Woakes' pattern) in which I place either some glycothymoline or a solution of B. & W.'s nasal soloids. And here let me repeat the warning which nose specialists are never tired of issuing, against the use of nasal syringes and other appliances whose use is accompanied by

force; this does not include vaporisers. In spite of the danger to the middle ear with which these contrivances are fraught, I am constantly being told by patients that their doctor has recommended them. It is no wonder that inflammatory mastoids are so common. In connection with the application of fluids to the nose, there are two rules which brook no exception. The first is that the fluids used must be warm, never cold; the other is that no force must be employed in their application.

Sir Hermann Weber is in favour of snuff. He says:

"Snuff is out of fashion at present; but to some people suffering from chronic nasal catarrh with frequent stuffing up of the nose, a pinch, taken once or twice a day, is useful by increasing the discharge and facilitating breathing through the nose, and also by maintaining to a certain degree the sense of smell up to old age; it seems to act by its stimulation as a species of gymnastics on the capillaries of the Schneiderian membrane. Many doctors in former times maintained that snuff-taking was a good practice against some forms of frontal headache and blear eyes, and I think with good reason."

When an elderly man is safely in his bed he should be directed to spend five minutes in applying deep massage to his two iliac fossæ. To the right, for the purpose of stimulating the cæcum to empty its contents; to the left, in order to help the contents of the bowel past the kinks, which are so often obstructing it. If another minute or two is then spent in massaging the tissues of the neck, the thyroid gland will be benefited and sleep facilitated.

Acidosis in a mild form is a chronic state with a good number of old people. They may therefore

be advised to take alkalies quite freely. I am in the habit of advising elderly folk thus troubled (*a*) to avoid excess of fat in their foods, and (*b*) to keep a bottle of alkaline tablets, say soda-mint or potassium bicarbonate, or both, and to take two or three of each, followed by a draught of hot water just before retiring. This will often prevent any tendency to insomnia or nightmare. For the flatulent distension which so often troubles people with lax abdominal muscles, especially at night, nothing can compare with a few drops of spt. cajeput on a small piece of bread, swallowed with the alkaline tablets. A preparation which I have found very useful in this type of indigestion in old people is one which contains papaw, charcoal, and sodium bicarbonate. It comes from America, the home of dyspepsia, and is called "Bell-ans." [1]

A not uncommon cause of a certain amount of insomnia is over-smoking after the evening meal. Some people will light cigarette after cigarette, and even pipe after pipe, from the moment they have finished the last meal until the moment comes for retiring. I have already called attention to the fact that people when old are more susceptible to drugs than when young. In this connection tobacco must be regarded as a drug, for it is an undoubted fact that tolerance for tobacco which seems to increase up to about 50 years, decreases with great rapidity thereafter. People become such slaves of habit, that it often does not occur to them that the five or six pipes a day to which they have for years been accustomed, could begin to do them any harm merely because they are past their prime.

Sir Hermann Weber startled a great many very experienced members of the profession when in

[1] Thomas Christy & Co., 4 Old Swan Lane, London, E.C.4.

1908 he first published his opinion that too much sleep was a serious danger.

" Much sleep, namely, over eight hours—I speak here of adults—is more injurious than too little, especially in persons of full habits, by causing diminution of nervous energy or degeneration of the small arteries or capillaries in the brain, and in consequence apoplexy or premature decay of the mental faculties."

And he quotes Sir John Sinclair with approval as writing in 1833 :

" It is proper to add, that nothing is more pernicious than too much sleep. It brings on a sluggishness and dullness of all the animal functions, and materially tends to weaken the body. It blunts and destroys the senses, and renders both the body and the mind unfit for action. From the slowness of the circulation which it occasions, there necessarily follows great corpulency, a bloated habit of body, and a tendency to dropsy, lethargy, apoplexy, and other disorders."

Sir Hermann then proceeds as follows :

" At the risk of being blamed by those who maintain that a certain number of hours of sleep, say six to eight, is absolutely necessary, and that it must be taken by day if it cannot be taken at night, I may say that I have always recommended men of work, physical or mental, to rise at the same early hour, even if they had gone to bed later than usual, or had not slept well. There are, I need not say, a few necessary exceptions to this rule. . . . It is at present in England the habit of most men occupied with literary work to do it during the late evening hours ; they say that they cannot collect their thoughts and bring them into proper shape in the morning, but can do so in the

late hours of the evening, and better during the small hours of the morning. I acknowledge that it is so, but I maintain that this is only the consequence of a bad habit, and that for those who accustom themselves to it, the morning work is the best, and that this is also more in accordance with the laws of health."

There can be no doubt that sleep being an anabolic function and wakefulness a katabolic, the former should be taken but sparingly by those who, like the elderly, are in the nature of things unable to indulge in vigorous exercise or in other measures of very active katabolism. The allowance of the adage, "Six hours for a man, seven for a woman, and eight for a fool," is perhaps a slight exaggeration as applied to full adult life, but it is not any exaggeration in old people. In this matter, as in all others, they should be kept "up to the collar," not allowed to rust.

So much has been said in the preceding pages on the subject of diet in general, that there seems little to add in special reference to the senile period. But although I have nothing to withdraw or to modify in the principles enunciated, it may be well to emphasise the warning already issued against efforts on the part of the physician to make sudden or very drastic changes in the dietary of the old. In the presence of dietetic habits, be they theoretically never so unscientific, which have served a person's turn well into the senile period, the wise counsellor will be as conservative as he dare. Articles of food which are under reasonable suspicion of causing symptoms should of course be withdrawn, and vitamins and other rational and remedial foods insinuated whenever possible; but save in the absolute prohibition of butcher's

meat in any form, and of carbohydrate puddings, the general character should be altered very gradually.

The reforms to be instituted should begin by an attack on quantity. Most healthy old people are spare eaters by preference; others are not. In the case of the former, the physician who counsels extreme moderation may always count the patient on his side; it is from his relatives, especially his female relatives, that the opposition comes. And a very vigorous opposition it usually is; taking the form not only of violent reiteration of fallacious shibboleths, but also, I regret to say, of surreptitious insinuation of forbidden foods into the patient's diet. Beef-tea is added to the milk, and iron tonics to the coffee—"to keep up the strength." It requires a great deal of tact and diplomacy to overcome this attitude, if indeed it can ever be overcome. In the case of old people who eat largely because they enjoy the eating, a reduction may sometimes be effected by sending them for a cure to some health resort. Patients will often submit to restrictions while "taking the waters" to which they would never even listen at home.

About twenty years ago the British public suffered one of its periodical fits of therapeutic or prophylactic insanity. It was seized with the conviction that the *Bacillus bulgaricus* which Metchnikoff discovered and described, when added in tabloid form to milk, was capable of facturing a veritable elixir of life. The demand for Metchnikoff's bacillus produced a supply of all kinds of fantastic preparations, bulging with every kind of bacillus except the Bulgarian, and after having been responsible for much disappointment and a great deal of unnecessary illness, the vogue died.

And, unfortunately, with the vogue, there died all confidence in the correctness of Metchnikoff's teaching; the worthless substitutes killed the real truth. We have now fortunately emerged from that particular fog and are in a position to estimate what, if any, are the virtues of the real *Bacillus bulgaricus* in pure culture in a suitable medium. My own opinion, which is based upon the experience of a fair number of cases, is that the bacillus is capable of rendering very valuable assistance as an intestinal detoxicant, especially in old people. When taken perseveringly for several weeks it deodorises the fæces and stimulates peristalsis. It is of course by no means a panacea, but it is a perfectly harmless and very efficacious means of improving the conditions in a putrefactive colon, more efficacious than any of the so-called intestinal antiseptics which I have tried: it reinforces the army of friendly microbes. There is now less difficulty than there used to be of obtaining the genuine article. Messrs. Aplin & Barrett, the proprietors of St. Ivel cheese, have made a very special study of the *Bacillus bulgaricus*, and are ready to welcome any member of the profession to their laboratories for a demonstration of their methods. I always advise patients to apply direct to the firm, from whom they receive all the necessary directions as to the best form of vehicle for the bacillus and the dosage.

Constipation is so common with elderly folk as to amount almost to a rule. I have already explained that in the case of natural feeders, stasis is seldom the serious matter which it usually is in the case of full meat-eaters. This is another reason for urging upon old people the desirability of avoiding those foods which are liable to cause

putrefaction, and to cultivate those which are vitaminous and fermentative. It would be reasonable to regard relative stasis as to some extent normal in old people; in common with all their other activities, their powers of excretion are slowing down, and delay in the discharge of the intestinal contents is probably accompanied by a reduced absorption into the portal radicles. It is the custom with many physicians to advise against laxatives in the aged on the ground that it is not well to irritate a tired organ. Having regard to the fact that most old people have come to depend very largely on laxatives, I think it is unwise to attempt to wean them therefrom, just as it is unwise to try and wean them from the moderate use of alcoholic drinks, or anything else not actively deleterious, to which they have become accustomed. The mistake which is usually made both by the profession and the public is to search for an aperient which shall not "create a habit." There is not, there never has been, and there never can be, such an aperient. Every drug sooner or later tends to establish for itself a physiological tolerance; antibodies are formed to counteract its activities, and the dose must consequently be raised. Than this search, it is better and more profitable to advise the patient to have a separate laxative for each day of the week, and to reserve for one day a special persuader which will ensure that the conduits are really free. This persuader need be nothing more formidable than a dose of castor oil or ½ grain or 1 grain of hydrarg. c̄ cret., to be followed by a saline in the morning. On the other days such simple laxatives as senna, rhubarb, aloes, Epsom salts, Glauber salts, belladonna, podophyllin, cascara, and paraffin can be

taken. Belladonna seems in some curious way to be very specially suited to old people. The dry extract in doses of ½ to 1 grain usually acts very well, even when taken daily for considerable periods. It is often combined with strychnine and aloin. The latter is unobjectionable, but inasmuch as strychnine raises the blood pressure it should be kept out of prescriptions designed for old people. I have known it to cause very unpleasant symptoms.

I have said in another place that I am unable to subscribe to the opinion that paraffin is a good general laxative for ordinary people. That it is specially useful in old folk, I am, however, very ready to concede; but even so, it is preferable to make it one member of such a group, as I have suggested, than to depend upon it to the exclusion of other things. But perhaps the best aperient for old people, as it certainly is for children, is castor oil. Most castor oils are nauseous, and when they are labelled tasteless, they are usually inert. I have found the preparation made by Squibb & Sons, of New York, to be quite free from these reproaches. There may be others, but I do not happen to have come across any which seem as satisfactory in these respects.

The toilet of the anal and perineal region in those who are inclined to eczema or other conditions provocative of pruritus—which means the majority of old people—should be very carefully attended to. After an evacuation the parts should be bathed with cold water, and anointed either with hazeline ointment or resinol. The ritual may seem troublesome at first, but as soon as the patient recognises its value in giving relief, and guarding against constant discomforts, it will be

continued—with gratitude to him who suggested it. As pruritus ani seems particularly to favour the night season, bathing with cold water before retiring, followed by the application of an astringent unguent or lotion, is much to be recommended. I have already mentioned Marcus Paterson's slumber-mats. They are particularly useful in prurigo, and in the many and various nocturnal discomforts of the aged.

Talleyrand said, " L'homme est une intelligence contrariée par des organes." On this it were a fair comment to say that if there were more intelligence, there would be less visceral contrariety. That the viscera are *contrariées* at all is obviously due to a lack of intelligence on the part of the possessor, and this is the cause of all the trouble. If the organs were treated with a moderate degree of intelligence there would be less interference with the intelligence by the viscera. And yet Plato's profound saying remains true. The Athenian philosopher said that " attention to health is the greatest hindrance to life." If he had said " over-attention," or " undue " attention, which is probably what he meant, he would have stated what has since become a truism to every medical man. Over-attention to health is an expression of fear, and in matters of health fear is the worst of all counsellors. Reasonable attention to the rules of healthy living, as they are now being unfolded by physiology and biology, are incumbent upon every reasoning being. The broad principles of fresh air, full exercise of all the faculties, physical and mental, and natural foods must be recognised and acted upon; but the meticulous examination of every trifling discomfort, and its elevation into a signal of threatening disease or

disaster, is to invite ill-health with outstretched hands. Now this atmosphere or environment is all too frequently imposed upon the old by the misplaced solicitude of the young. Old people are thought to have refined themselves into a very delicate and brittle sort of clay, whose only proper place is on a shelf, wrapped in cotton wool under a glass case. "Are you in a draught?" "Don't you feel exhausted?" "Hadn't you better lie down?" These and similar questions, suggesting debility, decline, and damnation, are constantly being addressed to old people, with the inevitable result of persuading them that the game is played and the end approaching.

From the influence of such a soft and solicitous atmosphere it is very difficult to escape. The implied suggestion is accepted, and becomes an ever-present auto-suggestion of "cannot" and "ought not" and "better not." Thus is a perfectly healthy man frequently conducted gently though firmly into his coffin.

Then there are those who deliberately adopt a pose of senescence from purely selfish motives. Young people, in this country at any rate, are very ready to defer to their elders, both physically and mentally, and the man who tacitly demands such deference usually receives it. He has only to be testy in order to escape contradiction; if he pretends stiff joints he is given the best arm-chair. Such an attitude brings its own punishment; for by dint of pretending, he inevitably and really becomes what at first he only posed as being. The play-acting is turned into grim reality by auto-suggestion, and the flag slides gradually down the mast.

The reverse is seen in the case of women; which

is the reason for the fact, which is so contrary to what one would expect, namely, that women live longer than men. One would suppose that reproduction being the primary function of the female, even of the human female, as soon as she had arrived at the age when reproduction is no longer possible, Nature would encourage her to shuffle off this mortal coil. If there is any intention of that kind in Nature's dispositions, it becomes completely nullified by the hereditary sex instincts of the daughters of Eve. For reasons into which it were superfluous here to examine, woman firmly and steadfastly declines to grow old. She takes every precaution, embraces every subterfuge, enlists every artifice, which may conceal, not only from others, but even from herself, the slightest trace of the enemy's passage. The endeavour is by no means always successful so far as others are concerned, but on the woman herself this exercise of talents is altogether beneficial. The blind eye thus turned to senescence is a sure preventive of premature senility, the auto-suggestion prompted by vanity becomes effective in securing longevity.

It is said by some people that the desire to keep young is inspired by the fear of death. I do not believe this to be even partially correct. I believe the desire to keep young, if it be not of itself purely intuitive and is really prompted by a dread of any kind, the dread is that of impaired efficiency, of becoming a burden to oneself and a nuisance to others. Most people, in theory at any rate, would prefer death to chronic invalidism. The fear of death is very real; indeed, in the case of men with otherwise well-balanced minds, Renan, for example, it amounted in his later years to an ever-present terror—at least he said so. When people

speak of the fear of death they mean, some of them, one thing, some another and a very different thing. The one is the fear of the sulphurous and otherwise unpleasant hereafter in which many of the faithful still appear to believe, a tenet which, however much it may tend to promote good manners, does nothing to soften the prospect of the inevitable departure.

The other meaning applied to the term " fear of death " refers to a fear of the act of dying. So many people have written and spoken of the pains of death that it has become to be generally assumed that dying is necessarily a painful process. That some deaths are painful is of course only too obvious, but they are on the whole in a minority, and among deaths in the period of senility they may be said not to exist. Senile, physiological death, is almost invariably quite peaceful. The life seems quietly to extinguish itself. The only pain is with those who assist at the gradual decline of what has perhaps been a great force. And this pain is often enhanced by the aberrations of intellect which so often precede the end. Was it not John Hunter's brother William who, just before he expired, said, " If I had a pen I could write how pleasant and easy a thing it is to die " ?

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